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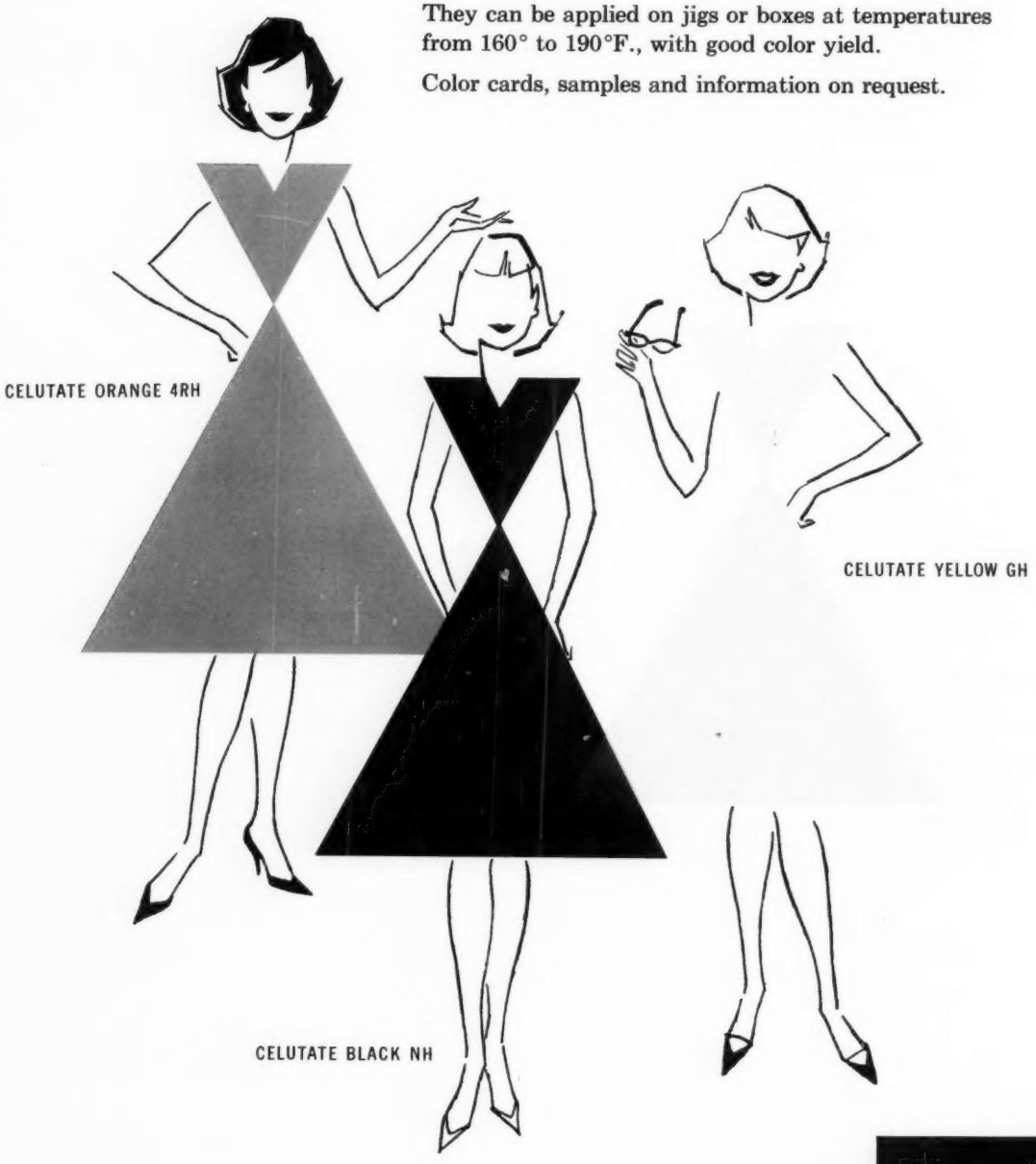

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November 2, 1959 No. 22

1959 Intersectional Contest
Second-prize winner——

ACCELERANT DYEING OF HYDROPHOBIC FIBERS—PRINCIPLES AND MECHANISMS*

PIEDMONT SECTION

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The use of accelerants (termed "carriers") in dyeing of hydrophobic fibers, ie, cellulose triacetate and polyester, with disperse dyes, is critically examined from the standpoint of mechanism and principles. A mechanism involving action of the carrier molecules within the fiber rather than in the dyebath is proposed.

The dye molecules diffuse through "holes" formed as fiber polymer interchain bonds dissociate under thermal agitation. The carrier is absorbed by the fiber and acts by partially replacing interchain bonds with more easily disrupted fiber-accelerant bonds. With this increased mobility, the number of openings will increase under the same thermal energy content resulting in a more permeable fiber and faster dye diffusion.

Guiding principles for the optimum use of carrier and a more objective insight into the mechanism are derived from basic experiments. Techniques required in the investigation of these new approaches are described for:

1) Solubility of dyes in carriers
2) Quantitative absorption of carriers by fibers
3) Effect of surfactants and liquor ratio on carrier action
4) Desorption of dyes in presence of carrier
5) Effect of carrier pretreatment of fiber on subsequent dyeing rate
6) Effect of carrier on water imbibition
7) Migration of dye from carrier films
8) Physical effects of carrier on fiber

The principles established and the proposed mechanism have been successfully applied to a number of problems and questions confronting the practical dyer.

INTRODUCTION

IN view of the slow dyeing rates of the hydrophobic fibers, such as the polyesters (Dacron, Kodel, Terylene), cellulose triacetate (Arnel), the acrylics (Verel, Darvan) and others, means of accelerating the dyeing rates have been sought in order to get good exhaustion and full shades in reasonable, practical dyeing times. The use of chemicals, which when added to the dyebath, results in an increased dyeing rate of five to 50 times the dyeing rate in their absence, has been a practical means of achieving the desired increase in dyeing rate. "Carrier" is the term used to describe this type of accelerant, particularly when used in dyeing hydrophobic fibers with disperse dyes. Although the term is derived from a postulated mechanism which is still in question, the designation of accelerant as carrier is recognized as standard terminology. Although dyeing rates may also be increased by higher dye temperature at superatmospheric pressures, the use of carriers in conventional dyeing machines is widely accepted as standard dyeing practice. With the advent of newer polyester fibers and other acrylics, etc, the use of carriers in dyeing of fibers and their blends will receive more widespread application.

Although carrier use is now dyehouse practice, the practical dyer lives in a state of insecurity where his knowledge of factors controlling carrier action is limited. The fundamental knowledge of the mechanism of carrier action and principles underlying use of these dyeing accelerants is far from complete. In fact, it is in a state of conflicting opinions with many points left unanswered because of lack of information or demonstrated principles.

The standard operating procedure for carrier use as derived from the fiber producer, the dye manufacturer, or the supplier of the dyeing accelerant will serve to eliminate many practical difficulties if followed faithfully. Without a deeper knowledge of basic facts concerning carrier action, the *practical dyer* finds himself at a loss, however, when the inevitable troubles occur in dyeing. More than ever, the practical dyer today must have a more complete technical

* Presented October 9, 1959 during AATCC's 38th National Convention at Washington, DC

TABLE I

Relative diffusion rate

Fiber	Dyeing temp (°C)	Relative diffusion rate CI Disperse Orange 3	CI Disperse Red 15	CI Disperse Violet 1
Terylene	85	1	1	1
Terylene	100	48	34	31
Nylon	85	680	1000	450
Secondary acetate	85	460	286	452

TABLE II

Saturation value of dyes

Fiber	Dyeing temp (°C)	Saturation value of dyes CI Disperse Orange 3	CI Disperse Red 15	CI Disperse Violet 1
Terylene	85	4.1	12.0	4.4
Terylene	100	4.8	10.7	4.7
Nylon	85	2.0	4.4	4.9
Secondary acetate	85	5.1	11.2	8.3

background if he is to successfully dye newer fibers and their blends. The *fiber producer* must need to know the types of accelerant materials which are specific for his fibers, their fate in the dyebath, their effect on the fibers, their ease of removal, and their effect upon colorfastness properties. The *dye manufacturer*, in creating new dyes or in selecting ranges for the newer fibers, must obtain information on the behavior of dyes in the presence of dyeing accelerants with respect to dyebath stability, spotting, and maximum dyeing rate and exhaustion. The *manufacturer of textile specialties*, who supplies dyeing accelerants, has the responsibility of offering those products which give minimum difficulty with foolproof procedures based on information communicable to the dyer.

Although the literature provides a number of worthwhile reviews of dyeing phenomena in the presence of carriers, there is no universal agreement as to the mechanism of carrier action. In fact, there is decided disagreement as to the mechanism of accelerant action. Nine theories have been advanced, all of which are derived from observed phenomena. Theories of the mechanism intuitively derived from observation of single phenomenon do not present a sound scientific basis upon which the practical dyer, fiber producer, dye manufacturer and chemical manufacturer can build to give a foundation for carrier use.

It is a prime objective of this paper to obtain new basic information and data that will lead to a truer conception of carrier mechanism. A second objective of this paper is to examine the current theories in light of the data gathered by key experiments aimed specifically towards proof or disproof of the particular theory. A third objective is to show the underlying principles which derive from the study of the mechanism of carrier action. Where principles are understood, the solution of many of the problems which stand in the way of the optimum use of accelerants in dyeing will be furthered.

The role of water in the dyeing process using carriers is not fully understood. Schuler (*12*) has shown that dyeing rate increases several-fold in an isooctane system when a small quantity of water is added. The mechanism described for organic carriers should also apply to this behavior of water absorbed by the fiber, in accelerating the dyeing rate. The experimental approaches aimed at this phase of the study included a) the effect of carrier on water imbibition, and b) the effect of carrier on diffusion of water containing small mobile molecules.

In setting up the experiments, critical information sought has been in those areas as to 1) whether the carrier acts in the dyebath or in the fiber; 2) the interaction of the dye and carrier; 3) the effect of carrier on fiber, and 4) the overall picture of mechanism of dyeing as affected by the presence of carrier using the most recent principles established for dyeing with disperse dyes.

BACKGROUND

THEORETICAL CONCEPTS OF CARRIER ACTION——Waters(*1*) in 1950 used the term "carrier" in connection with the addition of chemicals in the dyebath to increase the rate of dyeing the polyester fiber. To illustrate the need for acceleration in the dyeing rate, Table I, as taken from "The Dyeing of Terylene" (ICI handbook)(*2*) shows the relative dyeing rate of Terylene as compared with acetate and nylon.

The further question as to whether the problem is one of intrinsic solubility in the fiber is answered in Table II (from the same source) where the saturation values of typical disperse dyes show that this is not the limiting factor.

Waters(*1*) & Vickerstaff(*3*) have reviewed the early work on accelerants with respect to suitable chemical compounds and made practical suggestions as to their use on Terylene.

It was early recognized that, in making practical use of carriers, account must be taken of a considerable number of factors including cost, efficiency, ease of removal, possible toxic effects, and the effect of carriers on the physical properties of the yarn as well as the fastness properties of the dyed shade.

In the search for carrier materials for Dacron which would have the best combination of properties, a number of published reports have been issued. These include those of Zimmerman (*4*), Landerl(*5*), Fern & Hatfield(*6*), and Carmichael(*7*). Fortess(*8*) has discussed carriers suitable for the dyeing of cellulose triacetate.

Nine theories have been advanced to account for accelerant effect due to carriers. These are listed as:

1) Swelling
2) Increased water imbibition
3) Transport (carrier)
4) Increased solubility of dye in bath
5) Increased availability of dye from film
6) Liquid fiber
7) Increased sites—accessibility
8) Lubricity of fiber molecules
9) Loosening of fiber structure

Waters(*1*) postulated that the accelerants swell the fiber. The swollen fiber permits the large dye molecules to diffuse more rapidly into the fiber. The basic assumption is that shrinkage or contraction of the fiber is a function of the swelling. Data showing the contraction of hydrophobic fibers from solution of dyeing assistants confirmed the general picture that many products which showed accelerant action also tended to give pronounced contraction of polyester fiber. He was unable, however, to demonstrate conclusively that a good correlation existed between swelling action of accelerant and its effect upon increasing the dyeing rate. He qualified his conclusions by stating that factors other than swelling enter into the picture. The properties of contraction and changes in stress-strain curves have been related to carrier effects by Rawicz(*9*).

In the water-imbibition theory, as reviewed by Vickerstaff(*3*), products containing hydrophilic groups such as ortho-phenyl phenol or benzoic acid show rapid diffusion rate into the polyester fiber. The aromatic portion of the molecule is postulated to have Van der Waal's attraction for

the hydrophobic fiber and the phenolic hydrophilic end attracts water. The increased attraction for water increases flow of dye liquor with resulting increase in dyeing rate.

A second theory, also discussed by Vickerstaff(*3*), is that of the carrier or transport mechanism wherein the dye forms a loose complex with the carrier, and the dye-carrier combination is absorbed by the fiber more readily than the dye from its aqueous solution.

Zimmerman et al(*4*) postulate that the presence of carrier gives increased solubility of dye in the aqueous phase. The dyeing of disperse dyes is essentially from an extremely dilute aqueous solution of the dye. As soluble dye is absorbed by the fiber, insoluble disperse dye crystals dissolve. If the concentration of monomolecular dye in the aqueous dye liquor can be increased, the rate of dyeing should be increased. Thus, the way in which the dyeing assistant might increase the dyeing rate would be for the dye to dissolve in the carrier and in effect increase the solubility of the dye in the water phase.

In the film theory, the work of Peters & Sommers as quoted by Vickerstaff(*3*) concludes that water-insoluble dyeing assistants may function by virtue of their ability to surround the fiber with film. Since the dye has excellent solubility in the various accelerants, dyeing will take place faster from a more heavily concentrated source of dye in the film than from the dilute aqueous dyebath. Not only is the factor of greater concentration effective in the film effect, but there also remains the possibility of solvent dyeing. Millson(*10*), in his microdyeoscope motion pictures, has shown the presence of a considerable number of droplets of accelerant upon the surface of the fiber. A dramatic demonstration of the presence of surface carrier has been reported by Greer (*11*), who treated a polyester fabric, already dyed black, with orthophenyl phenol. He demonstrated the easily recognized appearance of a surface cloud of ortho-phenyl phenol crystals against the black background of the polyester fiber prior to the rise in temperature to the boil where the ortho-phenyl phenol disappeared.

The liquid-fiber theory postulates that the carrier is absorbed within the fiber. Within the fiber it acts as a "co-fiber" in that it dissolves and holds dye. One would then expect that the combination of fiber itself and absorbed carrier would increase the total pickup of dye, especially so since the dye has solubility in the carrier.

The increased-sites theory states that carrier opens up areas in the fiber which have hitherto not been accessible either because of the closely compacted structure which is difficult to penetrate or because the carrier changes the ratio of dyeable amorphous to nondyeable crystalline areas. With decreased crystallinity, additional areas would be available for dyeing.

The lubricity theory states that the carriers act as molecular lubricants, becoming attached to the polymer molecules of the fiber and destroying existing crosslinkages. This is closely related to one explanation of the effect of plasticizers in plastics. In such a plasticized fiber, the tendency would be for polymer chains to slide more easily over one another when crosslinkages are disrupted, whence diffusion of dye molecules will be facilitated. Schuler(*12*), working in a dyeing system involving solutions of carrier in isooctane, theorized that the dyeing assistants dissolve in the polyester fiber and may lubricate the interior of the fiber, permitting a more rapid diffusion of the dye molecule within the fiber. He also showed that, in this isooctane system, the presence of a small amount of water tended to increase the dyeing rate. All dyeing assistants are closely similar in effectiveness when they are present in the fiber at the same molal concentrations.

In the loosening-of-fiber-structure theory, as summarized by Fortess and Salvin(*13*), it is postulated that carriers are absorbed into the fiber by the same dyeing mechanism as that of disperse dyes. The dyeing accelerant diffuses into the fiber rapidly because of its smaller molecular size. It, like the dye, may be absorbed on the polymer chain by virtue of Van der Waal forces or hydrogen bonding. The accelerants solvate the fiber molecules, reducing the intermolecular forces that give the fiber-fiber bonds by replacing them with weaker fiber-accelerant bonds. Under influence of thermal agitation, increased vibration gives greater opening and closing with increased number of "holes" opening up. Diffusion of dye is increased where fiber molecule segments exhibit this increased mobility.

Glentz, Beckman and Wander(*14*), in a recent article on mechanism of dyeing of hydrophobic fibers with disperse dyes, have directed attention to the shapes of the diffusing dye molecules as related to the intermolecular spaces within the fiber. The attractive energy effects between dye and fiber that influence mobility of dye have been examined in light of electrical forces, such as dipole moment. Salvin(*15*) points out the specificity of disperse dyes for cellulose triacetate and polyester fibers. The crystal growth of disperse dye particles becomes a factor where dyeing rate is slow. Carrier action could become an important factor with newer dyes of borderline dyebath stability a) in solubilization of dyes with agglomeration tendency, and b) in favoring exhaustion of dye onto fiber before crystal growth in bath presented a problem.

It has been an objective of this investigation to give not only basic understanding but also to give practical explanation of a number of dyeing - accelerant problems and questions that have both intrigued and plagued the practical dyer. The practical dyer in 1959 more than ever requires a sound technical background because of the complexity of problems which face him daily. His ability to solve these problems will depend upon the soundness and correct use of the principles which he learns.

A criterion of the soundness of a mechanism of accelerant dyeing is its ability to explain the following types of questions:

1) What is the optimum quantity of carrier useful for a specific dye for a specific depth of shade?
2) What effect does change in liquor ratio have on the effectiveness of carrier action with constant percentage on fabric weight?
3) What is the effect of adding surfactants, and of surfactants of different leveling properties, upon carrier action?
4) Why do carriers show specificity for different fibers—cellulose triacetate, polyester, etc?
5) Why should there be an advantage in addition of dyeing accelerant before addition of dye?
6) What actually happens to the dyeing accelerant in the dyeing and the finishing process? Why is residual carrier so difficult to remove?

7) Do the principles established throw any light on the phenomena of dye spotting?
8) Why does carrier change its effectiveness when used upon Arnel or polyester fibers that have been heat treated?
9) What are the underlying principles that make up the difference between water-soluble and water-insoluble accelerants?
10) How much loss, if any, in carrier effectiveness is shown when fabric is initially pretreated with carrier and then entered into a new dyebath?
11) Why do carriers affect the exhaustion rate of dyes, and is there an optimum percent of carrier for use?
12) Would carrier be of any value in pressure dyeing and upon what basis?
13) Is there a guiding principle which would distinguish between accelerants used for printing and those used for dyeing?
14) Is there any basic reason as to choice of carrier and function of carriers in minimizing staining of disperse dyes for cotton and wool?
15) What is the basis for changes in shrinkage and physical properties of fiber when treated in dyebath containing carriers?
16) What is the basic reason for control of pH in the use of carriers based upon phenols?

Any discussion of the mechanism of carrier action must essentially be based on the manner in which the carrier increases the rate-determining step of dyeing which is the diffusion rate of dyes within the fiber. It is basic to the study of the mechanism of carrier action that a foundation be laid of currently accepted principles affecting the diffusion rate of disperse dyes in hydrophobic fibers, as well as the nature of the fiber, its compactness and the accessibility to dye solution.

It is for this reason that the next section contains a summary of the principles of dyeing hydrophobic fibers with disperse dyes.

MECHANISM OF DYEING OF DISPERSE DYES ON HYDROPHOBIC FIBERS——No conception of the mechanism of accelerant action is possible without consideration of the principles of dyeing with disperse dyes and the physical structure of the fiber itself.

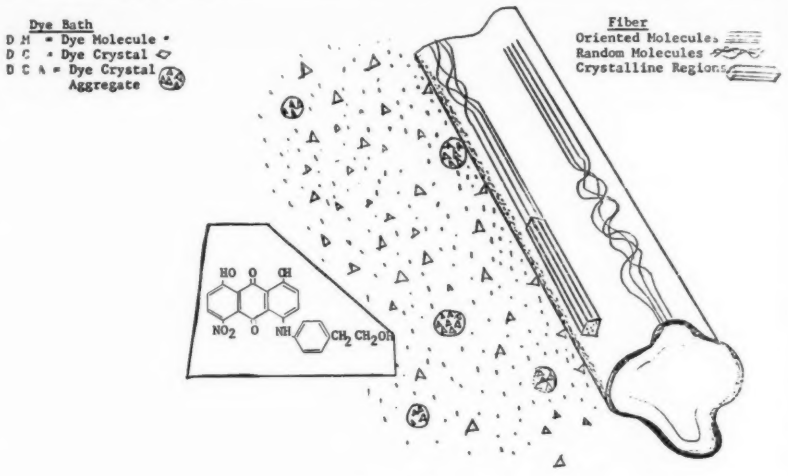

Figure 1
Diagrammatic representation of dyeing hydrophobic fiber with nonionic dyes

Factors affecting disperse dyeing have been examined recently by Bird (*16*), Glenz et al (*14*), and by Fortess and Salvin(*13*). Widely accepted principles of disperse dyeing will be incorporated into the mechanisms of accelerant action and are here stated for reference:

1) Dyeing takes place from water solution of dye; only single dye molecules penetrate the spaces between the long molecular chains of the fiber. The crystalline particles of dye must therefore be broken down into single molecules by solution in the dye liquor.
2) Dyeing takes place by solution of water-insoluble dye in the fiber. The cellulose acetate or the terephthalate ester (Dacron) dissolves the dye, due to various forms of linkage between dye and fiber: a) hydrogen bonding, b) dipole interaction, c) Van der Waals forces.
3) The dyes show an approximately linear equilibrium partition between dyebath and the fiber. The partition coefficient is dependent on the chemical nature of the dye, the fiber identity, the dyebath composition and temperature.
4) The diffusion within the fiber is the slowest step and is therefore the rate-determining step in dyeing of hydrophobic fibers. Dyeing starts with adsorption of dye at fiber surface. Ring dyeing occurs and the outer layer will become saturated with dye unless inward diffusion takes place. Dye adsorbed on the surface must diffuse inward for exhaustion.
5) Energy effects are important in rates of dyeing and equilibria. Increase in temperature raises the frequency of vibration of the fiber molecules. With increased frequency and amplitude of vibration, the spaces between the fiber molecules will open and close. Dye molecules also possess more kinetic energy. Since dye diffusion is through these spaces, diffusion rate increases with temperature. The dye molecule has affinity for the fiber. It attaches itself to the fiber molecule by electrical forces and must break these bonds in order to diffuse further into the fiber.
6) With the very hydrophobic fibers, such as polyester, and intermediate hydrophobic fibers, such as cellulose triacetate, there is considerably less water within the fiber as a medium for diffusion of dye.
7) The structure of the fiber is that of a bundle of long molecules containing both amorphous and crystalline regions, with dyeing taking place in amorphous regions. The more hydrophobic fibers are more compact with hydrogen bonding and other electrical forces binding one fiber molecule to another. These fiber-to-fiber bonds effectively constrict or close canals through which dyes can diffuse. The structure of the hydrophobic fiber is essentially that of a solid gel.

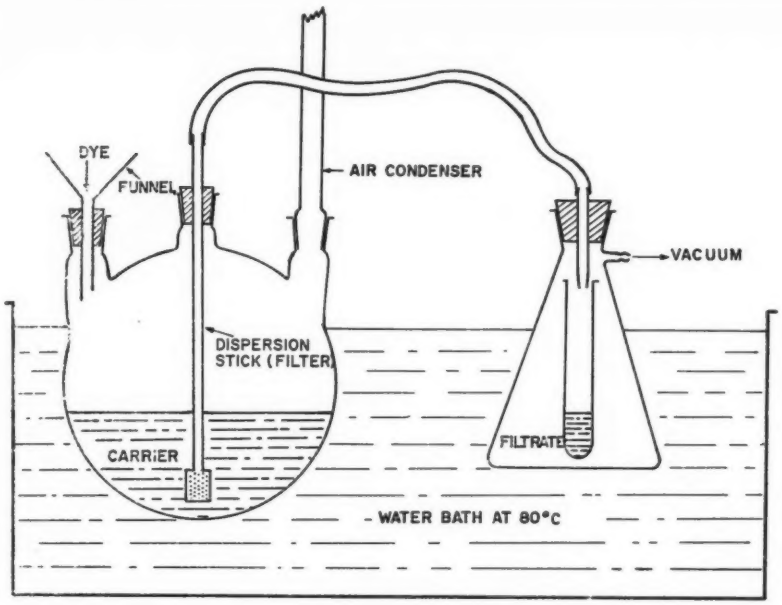

Figure 2
Dye solubility apparatus

8) Dyes of smallest molecular size and those with weakest bonding to fiber diffuse most rapidly in the fiber.
9) A schematic representation of dyeing is given in Figure 1.

From the standpoint of accelerant dyeing, accelerant must increase the diffusion rate and its effectiveness will be examined in light of above principles.

EXPERIMENTAL

In the setting up of the key experiments, the initial assumption was made that all of the nine theories of carrier action were logical and could not to be dismissed on the basis of the previously published work in this field. It was quite clear to the investigators that new data and original experiments were necessary to prove or disprove the specific theories. To that end, experiments were planned and carried out which gave data and established relationships on critical points. In a number of cases, unexpected results were obtained using these approaches. It was necessary to work out new experimental techniques to gain data in several areas hitherto unexplored.

Where previous work had established information and the experimental techniques were sound, it was not felt that this work required repetition. The objective of seeking a better understanding of mechanism of carrier action permitted the freedom of exploratory experiments which is not always granted where the objective is an immediately practical one of "what carrier and how much on a specific fiber". Dyes of variant dyebath behavior and carriers of different chemical nature have been included in order to show whether conclusions are universal or limited to a selected group.

EXPERIMENT I——— SOLUBILITY OF DISPERSE DYES IN CARRIERS

Quantitative data on the solubility of dye in carriers is important in theories which have been postulated for the mechanism of carrier action. Although it is known that dyes have solubility in organic materials used as a basis for commercial carriers, data of a quantitative nature has not been obtained. Moreover, solubility of the dyes at an elevated temperature close to dyeing temperatures has not been reported. The importance of this data becomes evident in reviewing some of the theories advanced for carrier action. In solubilization theory, the dyeing rate depends on the solubility of the dye in its aqueous dyebath. With dye soluble in carrier, it follows that an increased quantity of dye will be dissolved in a carrier emulsified into fine droplets, whence transference to the aqueous medium may be faster than from solid particles of dye.

In the film theory, it is postulated that the carrier forms a film around the surface of the fiber. Since the dyeing rate would be expected to increase with higher concentration gradient of dye in film, the dyeing rate would increase. The solubility of dye in this film would be a pertinent fact in choice of carriers as well as rates of dyeing.

In transport theory, the dye is dissolved in the carrier and the emulsified carrier solution is absorbed by the fiber with a higher concentration of dye than might be expected from aqueous solution. The liquid-fiber concept, that the dye dyes not only the fiber but also the carrier absorbed within the fiber, is dependent on solubility of the dye. With diffusion of dye within the fiber as a rate-determining step, the presence within the fiber of carrier offers a medium by which more rapid diffusion may occur from outer portions of the fiber structure to inner regions of lower dye concentration. The accelerant here could act as a carrier medium within the fiber.

Procedure

Determination of Solubility of Dyes at 80°C. Six dyes were obtained as oil color, free of dispersing agent and containing little or no salts. The five materials chosen as characteristic accelerants are those known to be useful in the dyeing of polyesters as well as cellulose triacetate. These materials are ortho-hydroxy diphenyl, methyl salicylate, tripropyl phosphate, butyl benzoate and trichlorobenzene. The solubility was determined using a constant temperature bath maintained at 80°C. Excess of dye cake in 150 cc of carrier was placed in a 250-cc flask equipped with a steel stirrer. The flask was immersed in a constant temperature bath and stirring was maintained for one hour to achieve equilibrium. The stirrer was removed and the dye solution withdrawn by vacuum, using an immersed fritted one-micron glass filter. A weighed portion of the dye solution was transferred to solvent and diluted to standard volume. Various solvents can be used for the dilution. These include dimethyl formamide and Cellosolve. The diluted samples were examined for dye content by spectrophotometric means. The absorbance of Latyl Blue BG was measured at 515 mμ, Latyl Cerise B at 672 mμ, CI Disperse Red 35 at 485 mμ, CI Disperse Blue 27 at 610 mμ, Interchem Yellow 4RL at

490 mμ, and Interchem Acetate Yellow GSF at 415 mμ. These wave lengths have been established previously as points of maximum absorption in respect to the dyes. The content was obtained on standard curves of transmittance. All dyes show a direct relation of concentration to absorbance in this range. Good duplicability was obtained by this procedure. The values given are on a weight percent basis rather than volumetric basis.

A sketch of the appartus used is shown in Figure 2. Solubility of the carriers at 80°C is given in Table III.

Correlation of Dye Solubility in Carrier with Carrier Effectiveness. The varying solubility suggested experiments in which exhaustion rate for specific dye could be compared with solubility in the carrier. These were carried out on cellulose triacetate using 8% CI Disperse Blue 27. (See Table IV). In dyeing experiments, full shades were dyed since pile on, exhaustion, and inward diffusion are most critical in this depth and effect of carrier is most clearly demonstrated. Dyeings were at equal active concentration of the carrier. Dyeing time, two hours; liquor ratio, 30:1; temperature, 95°C; carrier conc, four g/l in dyebath; carrier on fabric weight, 12%.

Discussion

Solubility of Dyes in Carrier.

1) An experimental technique has been described which gives solubility of dyes in carrier at temperatures close to actual dyeing temperatures.

2) Solubility of dyes in carrier is generally quite high and ranges from two to 30 percent on weight of carrier.

3) Solubility of dyes in carrier, as shown in Table III, does not follow a predictable trend but is specific for dye and carrier. Ortho-phenyl phenol has uniformly higher solvent power than trichlorobenzene.

4) The solubility of dyes in carrier is sufficiently high to give basis for theories based on dye solubility, ie, the solubilization theory, film theory, transport theory, and liquid-fiber theory.

5) Previous investigators have used low-molecular-weight dyes of relatively high solubility in dyebath and with no tendency for crystal growth. The dyes used herein include CI Disperse Yellow 37 and CI Disperse Blue 27, which have low water solubility and some tendency towards crystal growth(*15*). Although carriers may counteract this particle size behavior, the practical result has not shown that this factor alone gives increased exhaustion or dyeing rate. Thus triprophyl phosphate, an excellent solvent for CI Disperse Blue 27, has not increased the dye rate on Dacron.

6) Higher solubility of a dye in carrier does not result in any significant increase in accelerant action for that carrier. This is shown in Table IV where percent exhaustion of CI Disperse Blue 27 bears no relation to solubility of the dye in carrier. This experiment, showing no correlation between solubility of a dye in carrier and carrier action, must be cited against the theory of carrier action as due primarily to increased solubility of dye in bath. (Figure 3).

7) The solubility of dyes in carrier explains the lower exhaustion obtained where excess carrier is used.

8) Solubility of dye in carrier is not the sole criterion of effectiveness. Tripropyl phosphate shows good solubility character but is not an accelerant for Dacron.

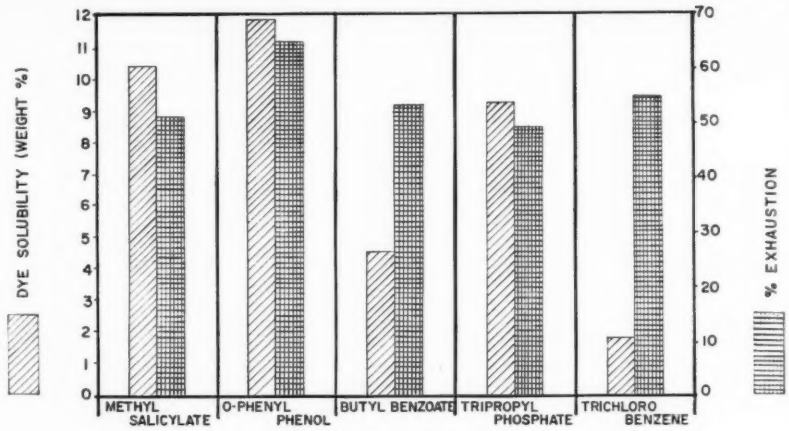

Figure 3
Noncorrelation of dye solubility and dye exhaustion

TABLE IV
Noncorrelation of solubility of CI Disperse Blue 27 with carrier effectiveness

Carrier	*Dye solubility*	*Percent exhaustion*
Methyl salicylate	10.4	51
Ortho-phenyl phenol	11.8	66
Butyl benzoate	4.6	53
Tripropyl phosphate	9.3	49
Trichlorobenzene	1.7	55

TABLE III
Solubility of dyes in carriers at 80°C (weight percent)

Dye	*Tripropyl phosphate*	*Ortho-phenyl phenol*	*Methyl salicylate*	*Butyl benzoate*	*Trichloro-benzene*
Interchem Acetate Yellow GSF	35	18	18	14	5
Interchem Yellow 4RL	28	9	11	13	3
CI Disperse Red 35	5	9.2	8.7	1.8	6
CI Disperse Blue 27	9.3	11.8	10.4	4.6	1.7
Latyl Cerise B	4	22	8.5	3.0	4
Latyl Blue BG	1.0	14	7.0	1.5	4

EXPERIMENT II——— ABSORPTION OF CARRIERS BY FIBERS

A number of the theories advanced for the mechanism of carrier action are based on absorption of the carrier by the fiber. Thus, in the liquid-fiber theory, wherein the absorbed carrier acts as essentially a cofiber for the dye, the dyeing rate and pickup should correlate with the percent of carrier absorbed. In those theories wherein the carrier is absorbed by the fiber to cause a physical change in the fiber, making for increased diffusion, it is necessary to establish whether the carrier is actually absorbed by the fiber and in what amount. Furthermore, it is important to know the relation between the amout of carrier absorbed and the increase in dyeing rate in order to arrive at optimum uses of carrier. Although it is recognized qualitatively that carrier is absorbed by the fiber, quantitative data have not been reported as to extent and type that permits use in study of mechanism of its action.

TABLE V
Absorption of carriers by fibers

TRIPROPYL PHOSPHATE DATA

Fabric	Percent carrier applied owf	Cleaning	Liquor ratio	Percent PO_4	Percent carrier on fiber	Percent exhaust
Arnel	3	scour,dry	3:1 jig	.47	1.13	37.7
Arnel	9	scour,dry	3:1 jig	1.32	3.17	35.2
Arnel	10	rinse	25:1	1.53	3.70	37.0
Arnel	10	dryclean	25:1	1.18	2.81	28.1
Arnel	10	rinse	50:1	.99	2.36	23.6
Arnel	10	dryclean	50:1	.90	2.15	21.5
Dacron	10	rinse	25:1	.13	0.31	3.1
Dacron	10	dryclean	25.1	.12	0.29	2.9
Dacron	10	rinse	50:1	.12	0.29	2.9
Dacron	10	dryclean	50:1	.09	0.21	2.0

TRICHLOROBENZENE DATA

Fabric	Percent carrier applied owf	Cleaning	Liquor ratio	Percent carrier on fiber	Percent exhaust
Arnel	10	rinse	30:1	2.87	28.7
Arnel	10	rinse	50:1	2.21	22.1
Dacron	10	rinse	30:1	3.77	37.7
Dacron	10	rinse	50:1	3.23	32.3
		ORTHO-PHENYL PHENOL			
Dacron	10	mild scour	20:1	3.8	38
Dacron	10	mild scour	30:1	3.3	33

The use of tripropyl phosphate offers an excellent means of obtaining quantitative data. The product, if absorbed by either cellulose triacetate or Dacron, can be analyzed by analytical gravimetric methods for the phosphate content.

Similarly, trichlorobenzene, which has not received attention because of its reputed toxicity, lends itself to quantitative examination since the fibers containing this product can be analyzed for their chlorine content. In the case of esters, such as methyl salicylate or butyl benzoate, a procedure is used in which the fabric is extracted with a suitable solvent, such as alcohol, and the ester content obtained by saponification equivalent. The quantitative determination of ortho-phenyl phenol is somewhat more difficult. The procedure used was based on increase in weight of Dacron treated with this carrier. Subsequent drying at 200°F for two hours removes water, leaving ortho-phenyl. A procedure using steam distillation of carrier-treated fabric, solvent extraction of the steam distillate with cyclohexane, and azoic coupling with CI Azoic Diazo Component 37 of the extracted ortho-phenyl phenol is a more quantitative method.

Procedure

Determination of Absorption of Tripropyl Phosphate by Cellulose Triacetate and by Dacron. Arnel was "dyed" in a Launder-Ometer using closed cans at 95°C for dyeing time of one hour. The bath contained 10% tripropyl phosphate and one part of nonionic emulsifying agent on fabric weight. Liquor ratios of 25:1 and also 50:1 were used. One gram of Igepon T per liter was present in the bath. At the end of the treatment, the fabrics were rinsed for five minutes in water at 20°C and then permitted to air dry. An additional sample of the fabric, air dried, was placed in perchlorethylene to remove surface tripropyl phosphate not readily removed by the simple rinse. The fabrics were then quantitatively examined for their phosphate content by means of gravimetric analysis.

Although tripropyl phosphate is not a carrier for Dacron, the absorption of tripropyl phosphate on Dacron was considered of interest. Dacron fabric is dyed at 95°C under the closed-can conditions used for Arnel. The fabric was rinsed and a parallel sample was given a perchlorethylene surface extraction to remove surface tripropyl phosphate. The phosphate content on the Dacron was determined by gravimetric analysis.

In order to further show the absorption of tripropyl phosphate as a function of liquor ratio, the absorption of tripropyl phosphate was determined. In this experiment three and nine percent of tripropyl phosphate on fabric weight emulsified with one percent nonionic surfactant were dyed at 95°C for three hours.

The fabric was rinsed and given a mild scour using one gram of Igepon T for 20 minutes at 20°C. The fabric was then dried at 110°C.

Determination of Absorption of Trichlorobenzene. The procedure used in this case is similar to that used for tripropyl phosphate. It was carried out on both Arnel and on Dacron. For the trichlorobenzene, 10% on fabric weight of the trichlorobenzene emulsified with nonionic surfactant in ratio of 10 parts of trichlorobenzene to two parts of surfactant was used. Absorption is carried out at 95°C for one hour in closed cans at liquor ratios of 30:1 and 50:1. Fabric is rinsed in water for five minutes at 20°C, air dried. Chlorine content is obtained gravimetrically by micro analytical methods.

Determination of Absorption of Ortho-Phenyl Phenol. The procedure here was used only for Dacron. Dacron of known bone-dry weight was treated at 95°C for one hour at liquor ratio of 20:1 with five g/l of Dowicide A (ortho-phenyl phenol) with acid added to give pH 5.5. The fabric was given a mild scour at 25°C with anionic surfactant, one g/l for five minutes. The fabric was centrifuged and then dried at 95°C for two hours to remove water. Increase in weight is taken as absorption of ortho-phenyl phenol. The data obtained is an approximation.

Discussion

Absorption of Carrier by Fibers.

1) Techniques based on microgravimetric analyses are used to obtain quantitative data. Such quantitative data in Table V has not been published hitherto. Methods are suggested for ortho-phenyl phenol, for ester types, such as methyl salicylate and butyl benzoate, as well as trichlorobenzene and tripropyl phosphate.

2) The quantity of accelerant absorbed by the fiber is surprisingly high. This degree of exhaustion represents a considerable portion of the carrier materials present. The evaluation of data should consider that the dyeings may not have been run to equilibrium and the detergent present in the bath acts as a retarding agent, preventing a maximum absorption. The possibility of some loss by outward diffusion during the rinsing should also be considered. The fiber picks up from 20% to 40% of the carrier present in the dyebath. The techniques and data offer experimental tools for relating carrier absorption with accelerant action as in Experiment III.

3) The carrier is tenaciously held and is not removed readily by standard rinsings or mild scourings. The absorption data for carriers and the tenacity with which they are held suggests that carriers attach themselves to fiber by same electrical forces as do dyes.

4) Carriers show variation in absorption with liquor ratio as might be expected from their water and surfactant solubility.

5) Technique of extraction with perchlorethylene is offered to distinguish betweeen surface carrier and carrier held within fiber.

6) The quantity of carrier absorbed is more than enough to give credence to theories of carrier action based on presence of carrier within fiber, ie, increased water imbibition, swelling, liquid fiber, increased sites and lubricity or loosening of fiber structure.

7) Data showing carrier as absorbed within fiber rather than on surface is an argument against film theory.

8) A key experiment is the finding that tripropyl phosphate is not absorbed by Dacron and is not an accelerant for Dacron dyeing. It is absorbed by cellulose triacetate and is a carrier for Arnel. Tripropyl phosphate is both a solubilizer for dyes and a film former. This finding focuses attention on carrier action within fiber rather than in the dyebath.

EXPERIMENT III——— EFFECT OF LIQUOR RATIO, SURFACTANTS AND PERCENT CARRIER ON ACCELERANT ACTIVITY

In Experiment II on the quantitative absorption of carrier materials on cellulose triacetate and polyester fiber, it was shown that the carrier pickup is dependent on liquor ratio and on the amount of carrier present in the dyebath. It now seemed logical to examine those conditions of dyeing using carriers involving liquor ratio, percent of carrier, and surface-active agents that might affect the absorption of carrier. Correlation of these conditions of dyeing in the presence of carriers and actual dye pickup would be expected to give useful information, not only of a practical nature, but also of value in the mechanism study.

A) EFFECT OF SURFACTANTS ———Procedures were undertaken to show whether the presence of excessive amounts of surface-active agents in the dyebath affects color value in carrier dyeing of hydrophobic fibers. Three types of surfactants were tested:

1) a nonionic ethylene oxide adduct of nonyl phenol, which exhibits considerable leveling and retarding action;

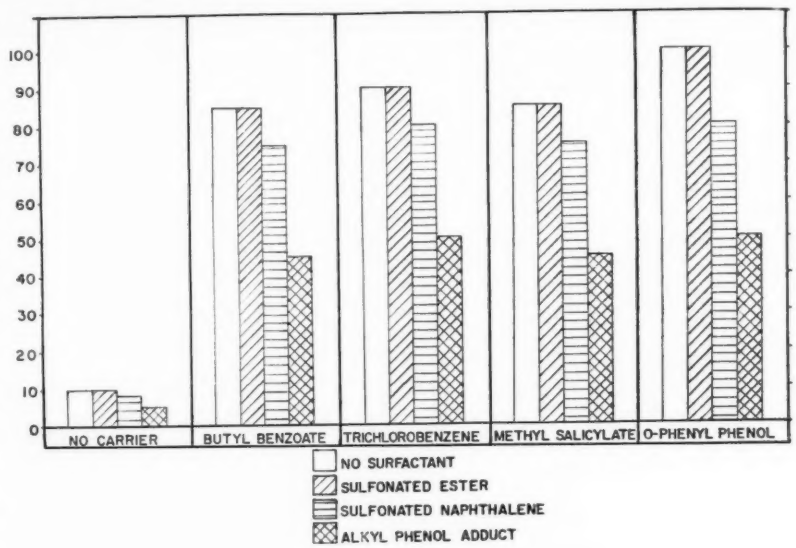

Figure 4
Effect of added surfactant on carrier action
CI disperse Blue 27—Cellulose triacetate fiber

TABLE VI
Carrier: Ortho-phenyl phenol

Surfactant type	Concentration (g/l)	Arnel % Reflectance (510 mμ) With carrier Scoured	Arnel % Reflectance (510 mμ) With carrier Extracted	Dacron % Reflectance (510 mμ) Without carrier Scoured	Dacron % Reflectance (510 mμ) Without carrier Extracted	Dacron % Reflectance (510 mμ) With carrier Scoured	Dacron % Reflectance (510 mμ) With carrier Extracted
Sulfated ester	0	17.0	16.0	22.0	24.0	17.5	16.5
	1	17.0	16.5	20.0	22.5	18.0	17.0
	2	17.0	16.0	20.0	22.0	17.5	16.5
	4	17.5	17.0	20.0	21.0	17.5	17.0
Sulfonated naphthalene	0	17.0	16.0	22.0	24.0	17.5	16.5
	1	18.0	17.0	22.0	23.5	18.0	17.5
	2	18.5	17.5	24.0	27.0	18.0	17.5
	4	19.5	19.0	27.0	27.5	19.0	19.5
Alkyl phenol adduct	0	17.0	16.0	22.0	24.0	17.5	16.5
	1	18.5	17.5	26.0	26.0	20.0	19.5
	2	21.0	20.5	32.5	30.0	23.5	22.0
	4	25.0	24.0	35.0	33.0	27.0	26.0

TABLE VII
Carrier: Butyl benzoate

Surfactant type	Concentration (g/l)	Arnel % Reflectance Initial	Arnel % Reflectance Scoured	Arnel (510mμ) Extracte	Arnel g Dye extracted	Dacron % Reflectance Initial	Dacron % Reflectance Scoured	Dacron (510mμ) Extracte	Dacron g Dye extracted
Sulfated ester	0	17	18	16	0.12	20	22	21	0.17
	1	17	18	16	0.10	21	22	22	0.02
	2	17	18	16	0.09	21	22.5	21	0.01
	4	16	17	16	0.08	21	22	21	0.01
Sulfonated napthalene	0	17	18	16	0.12	20	22	21	0.07
	1	16	18.5	18	0.10	23	22.5	22	0.03
	2	17	18	17	0.08	23	22.5	22	0.01
	4	20	20	19	0.07	23	23	24	0.01
Alkyl phenol adduct	0	17	18	16	0.12	20	22	21	0.07
	1	20	20	20	0.09	25	26	25	0.03
	2	22	23.5	22	0.09	25	28	27	0.05
	4	26	27	27	0.05	29	32.5	30	0.03

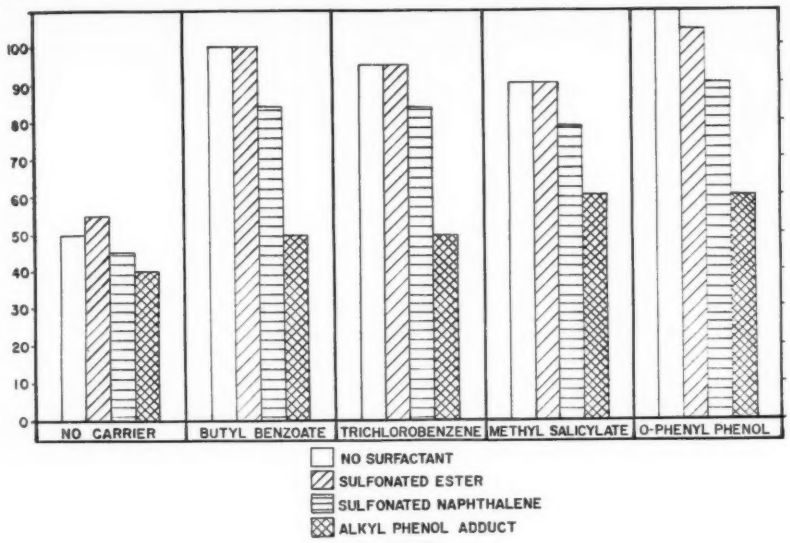

Figure 5
Effect of added surfactant on carrier action
CI Disperse Blue 27—Polyester fiber

2) an anionic sulfonated naphthalene condensate of moderate leveling and retarding action;

3) an anionic sulfated aliphatic ester of low leveling and retarding action.

TABLE VIII
Carrier: Trichlorobenzene

Surfactant type	Concentration (g/l)	Arnel % Reflectance Initial	Arnel % Reflectance Scoured	Arnel (510mμ) Extracted	Arnel g Dye extracted	Dacron % Reflectance Initial	Dacron % Reflectance Scoured	Dacron (510mμ) Extracted	Dacron g Dye extracted
Sulfated ester	0	17	18	17	0.11	20	20	18	0.01
	1	16	18.5	16	0.12	19	20.5	19	0.01
	2	16	18	18	0.09	20	21	18	0.01
	4	16	18.5	17	0.08	20	21	19	0.01
Sulfonated naphthalene	0	17	18	17	0.11	20	20	18	0.01
	1	18	20	20	0.09	19	22	20	0.01
	2	18	20	20	0.10	21	22.5	19	0.00
	4	20	22	21	0.01	23	22.5	22	0.01
Alkyl phenol adduct	0	17	18	17	0.11	20	20	18	0.01
	1	18	21.5	21	0.11	22	23	21	0.01
	2	19	22.5	26	0.13	23	25	23	0.01
	4	25	25	26	0.07	28	29	28	0.01

TABLE IX
Carrier: Methyl salicylate

Surfactant type	Concentration (g/l)	Arnel % Reflectance Initial	Arnel % Reflectance Scoured	Arnel (510mμ) Extracted	Arnel g Dye extracted	Dacron % Reflectance Initial	Dacron % Reflectance Scoured	Dacron (510mμ) Extracted	Dacron g Dye extracted
Sulfated ester	0	17.5	17.5	18	0.07	21	22.5	22.2	0.04
	1	—	17.5	17.3	0.06	21	22.5	21.7	0.04
	2	16	18	18	0.05	20	21	22.5	0.04
	4	16	18	18.5	0.06	20	21	22.7	0.03
Sulfonated naphthalene	0	18.0	17.5	18	0.07	21	22.5	22.2	0.04
	1	18.5	19.5	19.8	0.07	22	24	22.5	0.03
	2	18.5	19.5	20	0.06	23	24.5	24.2	0.02
	4	20.0	21	22	0.05	24	25	25.2	0.01
Alkyl phenol adduct	0	18.0	17.5	18	0.07	21	22.5	22.2	0.04
	1	18.5	19.5	20	0.09	25	27.5	27.0	0.02
	2	20	21.5	22	0.07	27.5	29	29.1	0.01
	4	23.0	24.5	25	0.05	30	33	30.6	0.02

CI Disperse Blue 27 was used in all tests as a dye of limited solubility in water and of slow dyeing rate requiring high accelerant action.

Two fibers were used—a spun cellulose triacetate and a spun Dacron. Reflectance measurements were used to obtain comparative dyeing depths. Visual examination confirmed reflectance measurements, especially where surface dye was removed.

Color values before and after perchlorethylene extraction gave an indication of actual dye pickup by fiber. The presence of surface dye has hitherto placed dye absorption data in doubt.

Dyeings were conducted in stainless-steel Launder-Ometer cans, using a two-hour dyeing cycle at 205°F.

Dyebath Formulation

Liquor ratio	25:1
Dye concentration	5% owf
Carrier concentration	12.5% owf (5 g/l)
Surface-active agent concentration	0, 2.5 5.0, 10% owf (0, 1, 2, 4 g/l)

Dyebaths were prepared from commercial carriers in accordance with manufacturers instructions, except that no surfactants, other than those under the test were added. It was assumed that emulsifiers present in the carrier formulations were chosen to give minimum interference with dyeing and that their effect should be constant.

Dyeings were conducted with and without carrier at each of four concentrations of surface-active agent. Carriers based on the following compounds were tested:

a) o-phenyl phenol
b) butyl benzoate
c) trichlorbenzene
d) methyl salicylate.

Dyed swatches were removed from the dyebaths, rinsed and dried. Dyebaths were examined for evidence of instability. Portions of the dyed swatches were extracted with perchlorethylene to estimate the extent of surface dyeing. The remainder of the swatch was given a light scour with detergent and soda ash.

Color value of the dyed, extracted and scoured swatches was determined by measuring the percent reflectance at 610 mμ (Bausch & Lomb Spectronic 20 with color analyzer attachment). The amount of dye extracted by the perchlorethylene was estimated photometrically. Data for the series of experiments are summarized in Tables VI-X. The bar graph shows relative color on extracted samples comparing for each commercial carrier the effect of adding 10% of surfactant on fabric weight to the dyebath. (Figures 4 and 5).

Discussion

Effect of Surfactants.

1) The color value, initially and after scouring, of the dyed swatches was affected by the concentration of surfactant added. The effect varied with the type of surfactant, the sulfated ester having little or no retarding action, the sulfonated naphthalene condensate a moderate effect, and the ethylene oxide adduct of nonyl phenol a very pronounced effect.

2) The loss of color value with increasing surface-active agent concentration was in the same order for all carriers and occurred even when no carrier was used.

3) The same relative loss of color value with increasing surfactant concentration was observed on both types of fibers tested, ie, Dacron and Arnel.

4) Extraction tests indicated that heavy surface dyeing occurred when no carrier was used. The amount of dye extracted varied inversely with the concentration of surfactant added to the dyebath. The same relationship applied when carriers were used although the amount of surface dye was considerably less.

5) The color value of the dyed swatches after scouring was essentially equal to that of the extracted swatches, indicating that the same surface dye was removed by both treatments.

6) The reflectance curves on the fabric before and after perchlorethylene extraction show that quantity of surface dye will vary with carrier activity. Poorly emulsified carriers and short dyeing times tend to give surface dye dissolved in film of carrier.

7) The use of excessive quantities of carrier and detergent has been recognized in practice as reducing exhaustion of dye.

B) EFFECT OF LIQUOR RATIO AND PERCENT CARRIER ON DYEING RATE —— Three fibers were examined in this dye exhaustion study. The objective was to determine what effect variation in liquor ratio and in percent of carrier would have on dye pickup.

Kodel was dyed with its recommended accelerant, butyl benzoate, using the same dyes as used for Dacron. Liquor ratio throughout varied from 15:1 to 50:1 with carrier on fabric weight at 10% and 20%. The accelerant used for Dacron was ortho-phenyl phenol. Arnel was dyed with carriers used for this fiber using one dye common to other fibers.

In setting up the experiment, dyes were used of varying solubility in dyebath and of different dyeing rates. Thus Latyl Blue 4R is slightly more water insoluble than is CI Disperse Blue 27. However, the Blue 27 is a slower dyeing dye for polyester fiber. Interchem Scarlet AR is a dye of higher diffusion rate within the Arnel than is CI Disperse Blue 27. The Scarlet AR has greater water solubility however.

Procedure

Dyeing was carried out for two hours at 95°C. Fabrics were scoured prior to visual examination of comparative dyeing depths obtained within each series—the darkest shade for the particular dye is taken as standard of 100 and the others estimated as the relative depth.

Data are given in Table XI. Curves showing effect of liquor ratio are shown in Figure 6.

TABLE X
No carrier

Surfactant type	Concentration (g/l)	Arnel % Reflectance Initial	Arnel % Reflectance Scoured	Arnel (510mμ) Extracted	Arnel g Dye extracted	Dacron % Reflectance Initial	Dacron % Reflectance Scoured	Dacron (510mμ) Extracted	Dacron g Dye extracted
Sulfated ester	0	21	21.5	22.5	0.2	25	26.0	32	0.2
	1	18	20.0	22	0.2	23	25.0	31.5	0.2
	2	17.5	19.0	20	0.15	23	26.0	31	0.2
	4	18	19.0	21	0.14	23	25.0	30	0.2
Sulfonated naphthalene	0	21	21.5	22.5	0.2	25	26.0	32	0.2
	1	20	22.0	23	0.16	27.5	30.0	33.5	0.2
	2	21	22.5	25	0.13	27	31.0	34	0.14
	4	24	26.5	27.5	0.12	32.8	34.5	37.2	0.06
Aklyl phenol adduct	0	21	21.5	22.5	0.2	25	26.0	32	0.2
	1	23	24.0	25	0.15	28	32.0	38.5	0.11
	2	24.5	26.0	27	0.11	35.5	40.0	41.5	0.04
	4	26.5	28.0	30.5	0.10	43	45.5	46.5	0.01

TABLE XI

Effect of liquor ratio and percent carrier on visual dyeing depth of Kodel

	4% Latyl Blue 4R LR 15:1	4% Latyl Blue 4R LR 25:1	4% Latyl Blue 4R LR 50:1	3% CI Disperse Blue 27 LR 15:1	3% CI Disperse Blue 27 LR 25:1	3% CI Disperse Blue 27 LR 50:1
10% owf Butyl benzoate	90	90	80	85	80	80
20% owf Butyl benzoate	100	95	90	100	95	95

Effect of liquor ratio and percent carrier on visual dyeing depth of Dacron

	4% Latyl Blue 4R LR 15:1	4% Latyl Blue 4R LR 25:1	4% Latyl Blue 4R LR 50:1	3% CI Disperse Blue 27 LR 15:1	3% CI Disperse Blue 27 LR 25:1	3% CI Disperse Blue 27 LR 50:1
10% Ortho-phenyl phenol	80	70	55	80	75	60
20% Ortho-phenyl phenol	100	100	90	100	95	90

Effect of liquor ratio and percent carrier on visual dyeing depth of Arnel

	2% Interchem Scarlet AR LR 15:1	2% Interchem Scarlet AR LR 25:1	2% Interchem Scarlet AR LR 50:1	3% CI Disperse Blue 27 LR 15:1	3% CI Disperse Blue 27 LR 25:1	3% CI Disperse Blue 27 LR 50:1
10% Tripropyl phosphate	100	90	75	85	80	70
10% Trichlorobenzene	100	90	90	100	95	90

Discussion

1) The nature of the dye and its dyeing behavior on the specific fiber must be considered. Schuler and Remington (17), using highly water-soluble dyes, ie, 1-amino-4-hydroxy anthraquinone and yellow sulfonamido diphenylamine structures, obtained results showing definite decrease in dyeing affinity with increasing liquor ratios. This could be due as much to greater solubility of the dye as to the lower absorption of carrier. The dyes used here are of relatively low water solubility. The more critical experiment shows liquor ratio to be a critical factor where carriers of more water-soluble nature are concerned, such as ortho-phenyl phenol. The effect of liquor ratio becomes less pronounced where products of lower solubility in water or in aqueous surfactants are used.

2) In the case of Kodel, using butyl benzoate, there was improved ex-

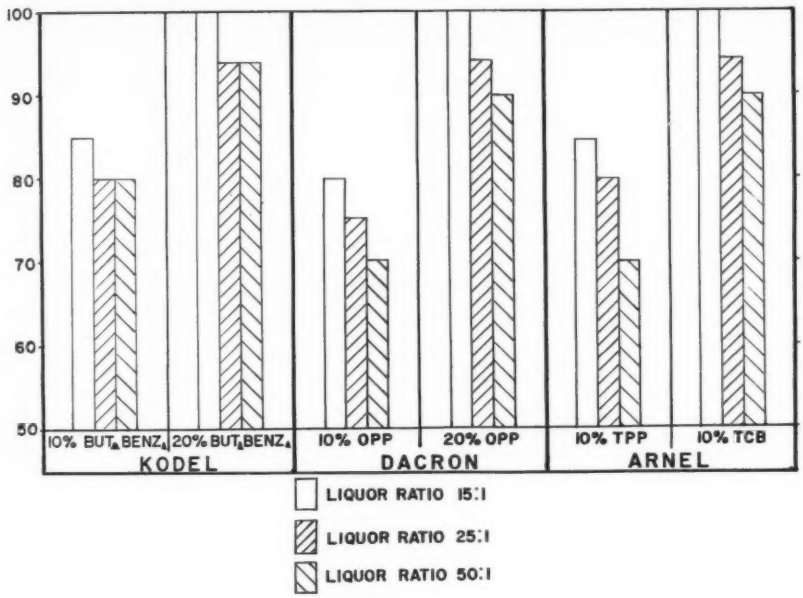

Figure 6
Effect of liquor ratio on carrier action (3% CI Disperse Blue 27)

haustion for CI Disperse Blue 27 with increase in carrier concentration. Liquor ratio appears less important here. This should be correlated to water solubility of carrier and percent pickup.

3) Arnel shows with tripropyl phosphate and with trichlorobenzene a definite fall off of exhaustion with increased liquor ratio at constant percent carrier on fabric weight.

4) The data demonstrates that carriers have several points of similarity to behavior of disperse dyes. They vary in their activity as accelerants with liquor ratio, with concentration on fabric weight, and with excess surfactant. Dyes show this same relation with respect to exhaustion values on the fiber. The differences due to liquor ratio and surfactant are more evident on the more water-soluble dyes and those of greater solubility in the surfactant. Reference is made to comparative pickup of carriers as a function of liquor ratio and concentration in dyebath in Experiment II.

5) Dyes with water solubility of .05 to .15 grams per liter will exhaust quite readily in short periods. It should be expected that carriers of this solubility will also exhaust in short periods onto the hydrophobic fiber. The carriers will show dyeing rate variation. Data on carrier strike, dyeing rate, levelness, etc, similar to that obtained for dyes is useful information. The need for such characterization is one of the practical recommendations of this paper.

C) CORRELATION OF DYE EXHAUSTION WITH CARRIER CONCENTRATION IN FIBER——In Experiment II, absorption data was given in trials run with tripropyl phosphate at liquor ratios of 3:1 using three and nine percent of active carrier on fabric weight.

Dyeing trials were run on Arnel with 8% CI Disperse Blue 27 on fabric weight using a) no accelerant, b) 3% tripropyl phosphate and 9% tripropyl phosphate. Dyed samples taken at intervals of one, two, and three hours gave both rate and exhaustion data. At end of dyeing, fabric was rinsed and actual tripropyl phosphate content determined by gravimetric analyses for phosphate. Fabric samples were given spectrophotometric analyses for content of dye.

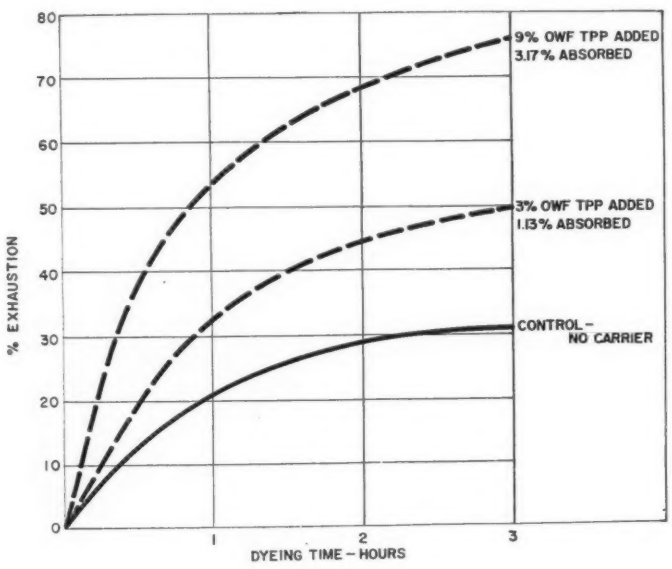

Figure 7
Relation of carrier absorption to dye exhaustion

Discussion

1) Curves in Figure 7 show direct relation of carrier content within fiber to dye rate and exhaustion, ie, the greater the actual carrier present, the higher the exhaustion.

2) The relation is additional evidence that activity of carrier is within fiber rather than in the external dyebath.

EXPERIMENT IV——— DESORPTION OF DYES AS AFFECTED BY CARRIER

Since the rate-determining step in dyeing hydrophobic fibers is the rate of diffusion within the fiber, it necessarily follows that the carrier has in some manner increased the diffusion rate. This is visually demonstrated by cross sections wherein carrier-treated fibers show good penetration whereas noncarrier fibers are ring dyed.

It was our thought that carrier

TABLE XII
Spun Kodel
Butyl benzoate carrier for dyeing and transfer

	Original	*Original after desorption*	*Depth on transfer cloth*
CI Disperse Blue 27	100	85	15
CI Disperse Blue 20	100	85	15
CI Disperse Blue 3	100	80	20
Eastone Blue GFD	100	65	35
CI Disperse Blue 15	100	80	20
Eastman Polyester Red B	100	75	25
Eastman Polyester Orange 3RLN	100	85	15
Latyl Cerise B	100	65	35
CI Disperse Red 35	100	70	30
Latyl Violet BN	100	90	10
Eastman Polyester Violet R	100	90	10
Eastman Polyester Yellow RL	100	75	25
Eastman Polyester Yellow W	100	85	15
CI Disperse Yellow 2	100	65	35
Latyl Yellow 3G	100	75	25

TABLE XIII
Spun Dacron
Trichlorobenzene carrier for dyeing and transfer

	Original	*Original after desorption*	*Depth on transfer cloth*
CI Disperse Blue 27	100	65	35
CI Disperse Blue 20	100	60	40
CI Disperse Blue 3	100	57.5	42.5
Eastone Blue GFD	100	70	30
CI Disperse Blue 15	100	85	15
Eastman Polyester Red B	100	70	30
Eastman Polyester Orange 3RLN	100	75	25
Latyl Cerise B	100	70	30
CI Disperse Red 35	100	70	30
Latyl Violet BN	100	85	15
Eastman Polyester Violet R	100	85	15
Eastman Polyester Yellow RL	100	65	36
Eastman Polyester Yellow W	100	65	35
CI Disperse Yellow 2	100	55	45
Latyl Yellow 3G	100	75	25

acting on dye within the fiber in desorption experiments would demonstrate two points:

1) that carrier action is within the fiber, and
2) that carriers may vary in their effect on desorption with additional variations shown by specific fiber and individual dyes.

To this end, experiments were designed to show effect on two polyester fibers with different chemical nature, ie, Dacron and Kodel. Two carriers were used on Dacron: a) an ortho-phenyl phenol-based carrier, and b) a trichlorobenzene-based carrier. Butyl benzoate was used on Kodel.

Dyes were used representing a full range of structures—diphenylamine, azo, and anthraquinone. The dyes vary also in their diffusion rate into the fiber, ie, low-temperature and high-temperature dyes.

Procedure

A series of dyeings were made on spun Dacron at liquor ratio of 30:1 at 95°C for one hour. Dye percentage on fabric weight was 2%. Fifteen dyes were dyed onto Dacron. Fifteen dyes were similarly dyed onto Kodel. In case of Dacron, ortho-phenyl phenol was used at five grams per liter of commercial product (approximately 60% active. Also for Dacron, five grams per liter of trichlorobenzene-based carrier was used (also taken as 60% active). For Kodel, five grams per liter of a 60% active butyl benzoate carrier was used.

Each dyeing was then cut in half and one cut treated in blank dyebath containing additional carrier (five gpl of same type as originally used), and an equivalent weight of undyed fabric. The transfer from one fabric to another was evaluated visually with original dyed fabric taken as 100 for reference. The data are tabulated in Tables XII, XIII, and XIV.

TABLE XIV
Spun Dacron
Ortho-phenyl phenol for dyeing and transfer

	Original	*Original after desorption*	*Depth on transfer cloth*
CI Disperse Blue 27	100	70	30
CI Disperse Blue 20	100	60	40
CI Disperse Blue 3	100	60	40
Eastone Blue GFD	100	70	30
CI Disperse Blue 15	100	85	15
Eastman Polyester Red B	100	75	25
Eastman Polyester Orange 3RLN	100	75	25
Latyl Cerise B	100	70	30
CI Disperse Red 35	100	70	30
Latyl Violet BN	100	85	15
Eastman Polyester Violet R	100	85	15
Eastman Polyester Yellow RL	100	65	35
Eastman Polyester Yellow W	100	75	25
CI Disperse Yellow 2	100	60	40
Latyl Yellow 3G	100	75	25

2) The data on leveling effect of representative carriers for polyester fibers is of particular interest in that no wide difference exists between the two products—ortho-phenyl phenol and trichlorobenzene. Yet dyes have widely different solubilities in these two solvents, as shown in Experiment 1. This behavior suggests that carriers are acting on the fiber rather than the dye. Any difference is in favor of the trichlorobenzene, which has less solubility for dyes.

3) When the dyed fabrics are entered into a bath containing only water and one gram of surfactant per liter at 95°C for one hour, the undyed transfer fabric is only stained.

Discussion

1) The outward diffusion of dye desorption is related to dyeing kinetics and in fact has been used to characterize dyes as well as dyeing properties of fibers. This technique has now been applied to show effect of carrier in accelerating the desorption rate. Under these conditions, the activity is on the dye within the fiber. This gives further support to the point that carriers act within the fiber by promoting diffusion and deemphasizes the effect of carriers in external phase of the dyebath.

Typical ratings would be 95-5 for dyes which with added carrier give a 65-35 relation. A more rigorous experiment would be to carry out desorption experiments on fabrics from which residual carrier has been removed or on dyeings made at higher temperatures under pressure.

4) The fifteen dyes used for this work include a wide range of structures and variations in dyeing behavior. On spun Dacron most dyeings are essentially equivalent in depth obtained comparing ortho-phenyl phenol and trichlorobenzene for carrier effect in dyeing.

The exceptions here are in CI Disperse Blue 20, a napthazarin structure, and Eastone Blue GFD and CI Disperse Blue 15, azo structures.

5) There is considerable variation in leveling character among the dyes. Eastman Polyester Yellow W, a dye of higher molecular weight and known to be of slower dyeing rate on Dacron, does not desorb to the same degree as CI Disperse Yellow 2, a lower molecular weight dye of faster dyeing rate on Dacron.

The concluding half of this paper will appear in the November 16th issue.

1959 Intersectional Contest—

THE CONTINUOUS WET PROCESSING OF COTTON-ACRILAN WORK-CLOTHING FABRICS*

SOUTH CENTRAL SECTION

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INTRODUCTION

PURPOSE———The textile industry still shows cotton as the king of fibers. Latest statistics show that 8,011,570 bales of cotton were processed during 1958. Approximately ten percent of this production was consumed in work clothing. In Table I is shown the distribution of this material in the work-clothing industry.

The introduction of Uniform Rental Services has emphasized and accentuated the need for fabrics of improved colorfastness and durability. For this reason the addition of synthetic fibers to the fabric has been studied. Several articles have been published on this subject and in Table II a comparison, for work clothes consumption, of the two fibers included in this paper is made.

The wearer of a rental uniform is, in general, less concerned with the preservation of the garment than would be the case if it were his own. This means fabrics more heavily soiled as well as exposed to more mechanical and chemical damage. Operators of uniform rental services, within reason, have to accept this situation and nevertheless supply a garment of satisfactory appearance. Because of this—and because commercial laundries expect cotton work clothing to withstand rigorous cleaning methods—standards for cotton work-clothing fabrics are probably the highest of any volume production item.

As we are dealing with a volume production item, continuous wet-processing methods are essential; therefore, our purpose was to develop suitable procedures for a fabric blend that would have certain inherent advantages of appearance, chemical resistance, abrasion resistance and cost. Home-laundry requirements for work clothing are, in general, less rigorous, and a considerable yardage of work-clothing fabrics is produced for pants, shirts and other garments for retail sale, which neither have nor require the standards for fabric going to uniform rental service. Simple inquiry readily established the interest of finishing plants in a blend such as we have considered, provided wet-processing presented no serious obstacle.

SCOPE———The introduction of a fiber into an accepted area of fabric usage creates the question of percentage of addition. The fiber-manufacturing companies have for years sought a precise, statistically sound test pattern. Their efforts leave them unsatisfied and the market is flooded with fabrics of varying percentages of fiber composition. Slowly the faulty blends disclose their weakness and the proper blend is attained and manufactured. Our work was aimed at a mid-point of fiber blending possibility in a fabric which would act as a guide to apparel fabrics in the areas mentioned. We believe that the processing procedures which we have developed will be applicable to other blends of cotton and Acrilan.

We limited the scope of this paper to greige fabric preparation and dye-

Fabrics employed for work clothing have a most strenuous wear life. The introduction of uniform rental establishments with their necessary vigorous cleaning methods have added to this condition. Cotton has always been the major fiber for these fabrics. Of late, the introduction of synthetic fibers to augment the attributes of natural fibers has yielded improved fabrics in many fields. The blending of cotton with Acrilan in work-clothing fabrics produces the same effect. The physical and chemical properties of these fibers complement each other. Work-clothing fabrics are volume items and hence must be produced on a continuous basis with relatively low costs. Using conventional cotton processing equipment for preparing, bleaching and dyeing, procedures have been developed to produce fabrics of equal colorfastness to cotton fabrics and improved abrasion, tear resistance and acid resistance. Because of these improvements, financial benefits accrue to both the people using work clothing of the blend and the uniform rental laundries.

* Presented October 9, 1959 at the Park Sheraton Hotel, Washington, DC, during the 38th National Convention.

TABLE I

Distribution of cotton in the work-clothing industry

	(500-lb bales)
TOTALS	*805,990*
Overalls & coveralls	*125,630*
One-piece suits	32,710
Overall jackets	30,860
Overalls, bib	*61,060*
Men's	55,210
Boy's	5,850
Work trousers	*570,550*
Dungarees	*281,170*
Men's	120,230
Boy's	160,940
Other	*289,380*
Men's	265,430
Boy's	23,950
Work Shirts	*103,810*
Men's	101,460
Boy's	8,350

Source: "Cotton Counts Its Customers," National Cotton Council of America.

TABLE II

Comparison of Acrilan and cotton

	Chemical Resistance			*Durability*	*Laundering*
	Acids	*Alkalis*	*Solvents*		
Acrilan	very good	fair	very good	good	good
Cotton	poor	very good	very good	good	good

TABLE III

Blend 50% cotton/ 50% Acrilan		100% Cotton	
% RH	Voltage	% RH	Voltage
30	18	30	5
20	26	20	10

TABLE IV

	Acrilan	Cotton
Average denier	2.95	2.15
Breaking elongation, %	28	8.5
Breaking strength, g/den	7	5

TABLE V

Chemical characteristics and conditions	Remaining strength				Elongation, to break %			
	Cotton Hours		Acrilan Hours		Cotton Hours		Acrilan Hours	
	1	10	1	10	1	10	1	10
Sulfuric acid 65% 70°F	Dissolved		100	100			95	85
Hydrochloric acid 10% 70°F	75	75	100	100	100	75	95	95
Sodium hydroxide 10% 210°F	90	80	50	Disv	95	85	25	—
Sodium hypochlorite 0.5% 70°F	80	65	100	95	85	75	100	90
Hydrogen peroxide 5% 70°F	95	80	100	95	90	80	100	95

ing. Finishing was specifically omitted since the variables introduced in this area are more dependent upon the equipment available at the plant and the imagination of the finisher than the precise end use of the fabric. Many fabrics with indistinguishable differences in hand and character appear on the market; yet, the finishing procedures and formulas are not remotely identical.

FIBER PROPERTIES

Since in our concept we indicated our dedication to producing an improved fabric, we undertook laboratory investigations to show the relative physical and chemical properties, important to our end product, of the cotton and Acrilan.

MOISTURE CONTENT——Under standard conditions (70°F, 65% RH), it was determined that Acrilan has a moisture content of 1.5% and cotton has a moisture content of 8.0%. Blending these two fibers obviously produces a fabric which is more hydrophobic than 100% cotton. It implies that liquid contaminants will more rapidly dry from the fiber. On the other hand, the 50% blend contains sufficient cotton to permit moisture absorption from the skin, which eliminates the damp feel of fabrics of 100% hydrophobic fibers.

ELECTROSTATIC POTENTIAL——Hydrophobic fibers, as such, increase the danger of static combustion. Since we are interested in work clothing, it was felt that this area should be investigated. Table III, which shows the results of tests conducted in accordance with the recommendations of the Bureau of Mines, reveals the acceptability of the 50% cotton/50%Acrilan blend. Readings below 200 volts are nonhazardous.

BIOLOGICAL AGENTS (MOTHS AND CARPET BEETLES)——Samples exposed in accordance with the AATCC test reveal the excrement weight for both the Acrilan and the cotton to be below the maximum acceptable.

MICRO-ORGANISM ATTACK——The cotton is damaged when exposed to the AATCC test; however, the addition of Acrilan to the blend decreases the overall deleterious effect. The blended fabric has a longer wear life under conditions favorable to micro-organism growth.

CHEMICAL DAMAGE——Table IV shows the fundamental statistics which are of importance in one's comprehension of the effect of various chemicals on these fibers.

The higher elongation before breaking of the Acrilan fiber increases the flex wear resistance.

Table V shows the effect of certain chemicals on these fibers.

In Table V we included the caustic soda solution at 210° since that is a standard processing condition in cotton bleacheries. Long before showing physical deterioration, the Acrilan fiber becomes yellow. The susceptibility of Acrilan to this condition necessitated additional work and, finally, modifications in our practical applications.

Solvents. Both fibers are impervious to the action of the generally recognized common solvents. The solubility of Acrilan in dimethylformamide, however, is the basis of a laboratory procedure for the quantitative determination of this fiber in a blend.

PROCEDURE——1) The fiber sample from which all nonfibrous materials have been removed is dried to constant weight in a weighing bottle at 100° to 110°C. The bottle plus sample is cooled to room temperature in a desiccator and weighed to 0.2 mg on an analytical balance (weight A). Approximately one gram of fiber is tranferred from the weighing bottle to a 250-ml beaker and the weighing bottle is reweighed (weight B). The actual weight of the sample is the difference between the two weights (weight A minus weight B).

2) One hundred milliliters DMF is added to the beaker containing the sample. The mixture is placed on a steam bath for 10 minutes while being agitated with a glass stirring rod. An interval timer or stop watch should be used to determine the time.

3) The DMF solution is then filtered through a dry, tared, coarse sintered glass crucible.

4) The residue on the filter is washed with 150 ml DMF and 300 ml distilled water, and is dried to constant weight at 100° to 110°C.

Calculations.

$$\text{Percent cotton} = \frac{\text{wt of residue}}{\text{wt of sample}} \times 100$$

This test is accurate to 0.20%

FABRIC CONSTRUCTION

An examination of the foregoing fundamental fiber characteristics reveals the complementing effect of cotton and Acrilan in a blend. The single fiber properties are essential primarily for basic decisions on the acceptability of fibers to specific end products. Our work is intended, however, for fabrics; therefore, an attempt was made to obtain a 100% cotton fabric which would match the construction of the blend we had selected. An exact match was not available; however, an army twill fabric which had been accepted for work clothing was used for comparison. Table VI reveals the original stronger construction of the 100% cotton fabric. It is heavier, has a tighter construction and is two ply in the filling. This is reflected in the higher tensile strength.

It is important to note however that, while the tensile strength is higher for the 100% cotton fabric, the tear strength and the abrasion resistance (so important to work clothes) is higher for the cotton/Acrilan blend.

FABRIC PREPARATION

LABORATORY AND PLANT PROCESSING——Bearing in mind our concept of developing a continuous process not entailing radical innovations either of equipment or procedures, we made an initial mill run with the 50/50 cotton/Acrilan fabric

TABLE VI

	cotton-Acrilan	Army twill
Ends per inch	100	114
Picks per inch	49	57.2
Weights, oz/sq yd	7.71	8.57
Yarn Counts:		
Warp	29/2	37/2
Filling	15.5	22.8/2
Twist:		
Warp ply twist	17.9 S	17.2 S
Warp single twist	19.7 Z	23.0 Z
Filling ply twist		14.2 S
Filling single twist	12.5 S	19.7 Z
Wrinkle recovery (Monsanto) degrees		
Warp	97°	55°
Filling	147°	99°
Tensile strength (grab) lbs		
Warp	135.0	222.0
Filling	63.0	160.0
Tear Test (tongue) lbs		
Warp	7.7	7.8
Filling	8.7	6.3
Stoll flex wear test, cycles		
(0.5-lb head wt)		
(tension = 5 lbs)		
Warp dry	2362	452
Filling dry	3095	505
% Fabric change in length in washing		
Warp 1 wash 100°F	+ 2.0	− 0.4
5 wash 100°F	− 0.8	− 2.6
1 wash 140°F	+ 1.6	− 0.7
5 wash 140°F	+ 0.1	− 2.3
Filling 1 wash 100°F	− 0.4	+ 0.2
5 wash 100°F	− 0.4	+ 1.4
1 wash 140°F	− 0.8	+ 1.2
5 wash 140°F	− 1.1	+ 0.7

using a standard procedure for the continuous processing of cotton work-clothing fabric. This included a continuous caustic boil; and the finished goods made it immediately apparent that the adverse effect of the hot concentrated caustic on the Acrilan precluded such a standard treatment. As will be noted later, however, a continuous procedure was developed which appears to be satisfactory and which eliminates the continuous caustic boil. Provided the end result is satisfactory, this simplification is advantageous, from both production and cost aspects.

MERCERIZING EXPERIMENTS ——Mercerizing is practiced on blends to give the cotton component greater luster, improved durability and better dimensional stability. Although sensitive to relatively low concentrations of caustic at high temperature, Acrilan has good resistance to the caustic at mercerizing strengths and temperatures and the blend lends itself readily to this operation.

Cuts of the 50/50 cotton/Acrilan fabric were mercerized on a laboratory range in caustic solutions of various concentrations. All experiments were run at a mercerizing liquor temperature of 80°F and a speed of two yards per minute. This low speed was necessary to allow adequate time for stretching and rinsing on the one-hundred-inch frame used with the laboratory mercerizing range. Using rinse water at 158°F, time under rinse was 45 seconds. After removal from tenter frame, the goods were further rinsed at 105°F, in a relaxed condition. Remaining traces of caustic were neutralized in dilute acetic acid, followed by rinsing at room temperature and drying in a relaxed condition.

Microscopic examination of cross-sections of the cotton fibers in these fabrics revealed varying degrees of mercerization. However, an all-cotton fabric mercerized by good commercial practice did not show 100% inflation or swelling of the fibers, indicating it is neither customary nor necessary.

This work is summarized in Table VII.

These mercerized fabrics were subsequently plant-bleached in a standard cotton procedure not involving caustic boil, and are discussed in the next section.

TABLE VII

Sample	Preparation	Caustic concentration NaOH	°Tw	Color* (after mercerizing	Tensile strength Warp	Filling	Degree of mercerization
1	Scoured	24%	52°	95	145	63	50%
2	Scoured	20%	44°	99	137	56	90%
3	Scoured	30%	65°	96	136	56	30%
4	Scoured	30%	65°	95	146	61	60%
5	Greige	20%	44°	96	144	60	90%
6	Scoured	Control	—	—	135	59	—
7	Plant processed	24%	52°	98	144	61	60%

* Color is based on spectrophotometric reflectance, using control as 100.

BLEACHING

Recognizing the limited requirements for full bleached goods as well as very light shades in the area of work-clothes fabrics, it is apparent that bleaching to the extent normally required for a full white is not essential. Our main objective was to prepare the fabric for mercerizing and dyeing.

Nevertheless, this did not deter us from exploring a number of continuous procedures aimed at achieving a full white. Although in no instance was a full white obtained, several of the procedures show considerable promise and a bleach bottom suitable for light shades was readily achieved. Among these, the single-stage non-silicate bleach (*1*) and the activated hydrogen peroxide bleach were noted particularly; the former having the added advantage of minimizing or eliminating scale build-up in equipment used for conventional peroxide-silicate bleaching.

In order to obtain an insight into the degrees of whiteness obtained, we evaluated a number of continuous procedures. Six of these procedures are presented and the results are shown in Table VIII.

DESIZED AND THEN BLEACHED

1) Three percent hydrogen peroxide (35%)
   1.5% disodium phosphate
   0.4% borax
   1.5 hr steam
2) Same as No. 1 except the pH of the solution was adjusted to pH 9 with sodium hydroxide.
3) Same as No. 1 except the fabric was pre-acidified with 0.75% sulfuric acid at 120°F for 30 minutes.
4) Pre-acidified as with No. 3 then bleached.
   3.5% hydrogen peroxide (35%)
   1.5% disodium phosphate
   0.4% borax
   1.25 hr steam
5) Wet out with 0.2 % nonionic surfactant, squeezed to 60% moisture content, then bleached as No. 1
6) Prepared as No. 5, then bleached with 4.0% hydrogen peroxide (35%).
   1.5% disodium phosphate
   0.4% borax
   pH adjusted to 8.4 with sodium hydroxide.

This shows that definite improvement on the color of the fabric is obtained. For fabrics requiring greater whiteness, conventional batch methods can be employed. By the following procedures reflectance measurements approximating 90% can be obtained.

TABLE VIII

Spectrophotometric measurements

Sample	% Reflectance Improvement	Actual
1	14	81.6
2	12	80.8
3	12	80.4
4	13	81.7
5	13	81.2
6	18	82.9
7 (control)	—	72.6

SODIUM CHLORITE BLEACH PROCEDURE

1) Set dyebath at 100°F with:
   0.4 oz/gal sulfuric acid
   0.4 oz/gal phosphoric acid
   0.2 oz/gal sodium cholorite 75-77% (eg, Textone) (MDC)
2) Raise temperature to 200°F and run 10 minutes.
3) Add 0.1 oz/gal sodium chlorite 75-77% and run 20 minutes.
4) Cool to 160°F by radiation and rinse until clear.
5) Neutralize for 20 minutes at 140°F with:
   0.2 oz/gal sodium bicarbonate
   0.2 oz/gal sodium bisulfite.

PERACETIC ACID BLEACH PROCEDURE

1) Set bath at 100° with
   1.5 oz/gal peracetic acid 40%
   .05 oz/gal nonionic detergent
   .2 oz/gal sodium hexametaphosphate (eg, Calgon)
2) Adjust pH to 6-7 with caustic soda.
3) Heat bath to 140° and run for 45 minutes.
4) Rinse well.
5) As with sodium chlorite bleaching, added whiteness can be obtained by aftertreating with sodium bisulfite.

For subsequent dyeing studies on bleached fabric, a cut of the 50/50 cotton/Acrilan fabric was continuously processed on a plant basis. The prewashed piece (to remove tint, mill soil, etc) was sewn in with regular production of cotton goods and followed the complete continuous wet processing for cotton goods, with the exception of the caustic boil: ie, singe, quench in enzyme bath, steep, wash, peroxide saturate, steam J box, wash, mercerize, wash and dry on cans.

Even though the continuous caustic boil-off was eliminated, saturation with peroxide and silicate followed by the steam J box exposed the goods to a high-temperature, relatively high alkalinity condition.

No full bleach was obtained which confirms other work. A fabric was produced, however, which had adequate whiteness for work clothes shades with good luster and generally pleasing appearance.

The goods mercerized in the laboratory experiments described earlier were run at another plant using a continuous bleach process as follows:

1) Pad at 140°F in solution containing alkyl aryl sulfonate, a proprietary surfactant, and sodium tripolyphosphate.
2) Cold water rinse.
3) Cold saturation; peroxide, silicate, caustic soda, borax and chelating agent.
4) Steam J box—45 minutes at 210° F.
5) Rinse—four sprays—followed by three boxes at 170°F.

DYEING

The objective of developing dyeing procedures is to produce desired shades of proper uniformity and fastness properties on the submitted fabrics. The procedures for dyeing cotton are legion; however, the dyeing of Acrilan, a relatively new fiber, is presented by but few researchers. In some instances all acrylic fibers are contained in one group. Hindle (*2*), Smith & Hindle (*3*), and Guion (*4*) offered the theories and practical application procedures for Acrilan. Turnbull (*5*), discusses the acceptability by the fiber of many dyestuff classes. Hadfield and Sokol (*6*), discuss the problems confronting the dyer. Burnthall (*7*) presented the most recent improvements in the dyeing techniques. From this brief literature survey it is apparent that the industry has sought an insight into the newer fiber. Very little, however, has been presented about the dyeing of blends. Smith and Hindle (*3*) did submit the use of vat dyes on rayon/Acrilan blends.

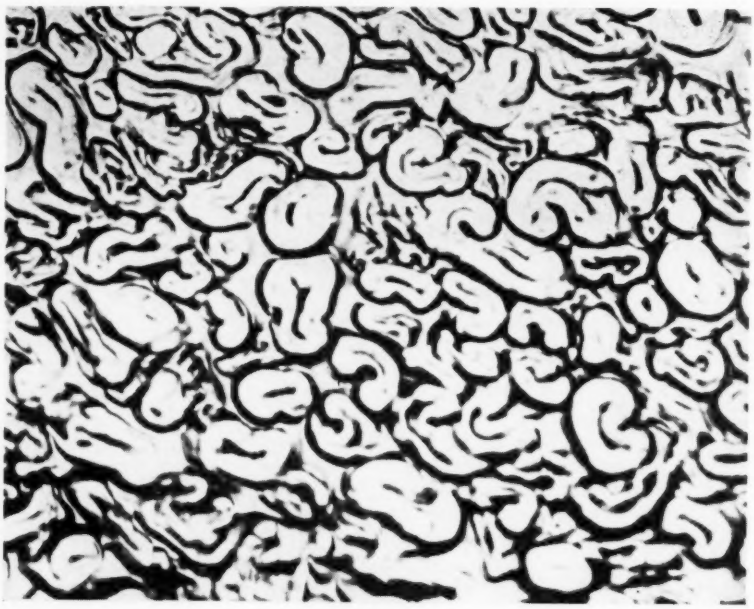

Figure 1
Cross section of continuously vat-dyed 100% cotton in forest green

These references pertain solely to batch dyeing, while a prerequisite of our work was the development of a continuous process. In order to be in line with commercial practice we endeavored to match or at least approximate standard tan(khaki). gray and forest green shades used regularly for work-clothing fabrics. Although many procedures were examined and evaluated, those unable to yield the desired shades were rejected.

Some comment regarding dyeing uniformity and penetration, fastness properties and consumer acceptability is in order. We defined the objective of dyeing procedures as producing desired shades of proper uniformity and fastness properties. Normally continuously processed cotton fabrics do not have the fibers completely penetrated. This is true even of work-clothing fabrics where standards are of the highest. It is known that deeper penetration can be attained, but at a cost of increasing the expensive vat dyestuffs. In Figure 1, a photograph of a forest green shade on 100% cotton work-clothes fabric is shown to illustrate the above. Lighter shades also show this effect, but in a black-and-white reproduction the detail is lost.

Our work indicates, as seen in Figure 2, that a greater penetration is attained on the cotton/Acrilan fabric at little or no increase in overall cost; hence abraded fabrics will remain true to shade for a longer period. Since the blend shows in general greater abrasion resistance, this appears to be an important feature.

Our investigation covered several dyestuff types, as follows.

SULFURS———Selected dyes of this class will dye union shades to medium depths with fastness properties approximately equal to sulfur dyes on 100% cotton. While the deficiency in fastness to chlorine limits the use of sulfur dyes on work clothing, many work-clothing fabrics do not require this property.

The sulfur dyeings were made by standard continuous methods. The dye was padded reduced with 60%

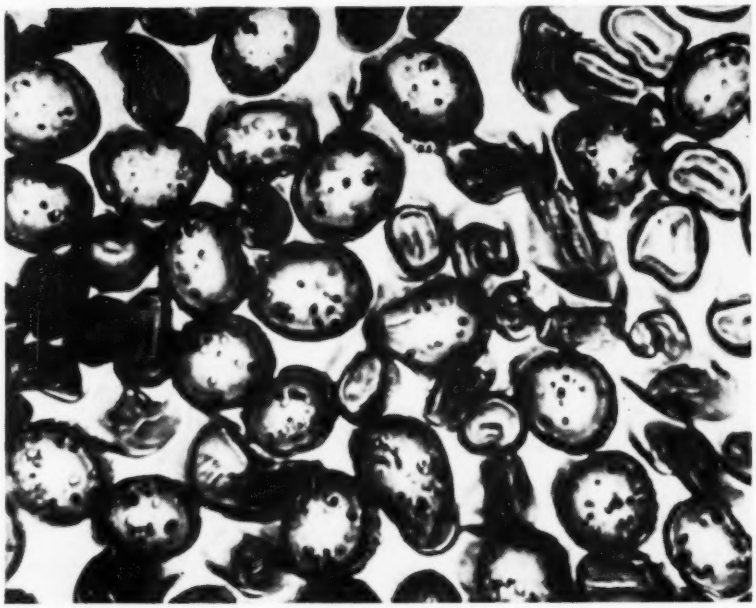

Figure 2
Cross section of continuously cationic—vat-dyed 50% cotton/50% Acrilan blend

pickup, steamed for thirty seconds at 212°F, oxidized with bichromate of soda and acetic acid, then given a mild soaping at 160°F. The goods were prepared as previously outlined.

Formulations

	Per 100 gallons pad liquor
Suntan	13 lbs 8 ozs Sulfur Brown RS solution 2 lbs 8 ozs CI Sulfur Black 1 solution (CI 53185) 1 lb ——— CI Sulfur Red 6 solution (CI 53720)
Grey	5 lbs 8 ozs CI Sulfur Black 1 solution (CI 53185) 4 lbs 8 ozs CI Sulfur Red 6 solution (CI 53720)
*Forest Green	52 lbs Sulfur Blue 13 solution (CI 53450) 60 lbs Sulfur Yellow 2 solution (CI 53120)

* The Forest Green dyeing has a heather effect since the Acrilan staple is dyed only light green.

VAT ESTERS (SOLUBLE VATS) ———Dyes of this class are satisfactory for dyeing unions in pastel shades. They may be applied by the conventional continuous pad-dry acid development process (*8,9*).

The colorfastness is essentially equal to the vat esters on 100% cotton fabric.

INDIGOID AND THIOINDIGOID VATS———While selected dyes of this group will dye unions on 50/50 cotton/Acrilan for light shades by the pad-steam method, the overall fastness of these dyes would not meet work-clothing requirements. Therefore, their use would be limited (*9, 10*).

ANTHRAQUINONE VATS——— For pastel and light shades, selected dyes may be applied by standard pad-steam, Williams unit range, or vat-acid continuous methods to give a satisfactory union with adequate fastness. The range of shades would include most of the light khaki or suntan work-clothing shades, but not the grays (*9*).

Aside from standard procedures and normal variables, such as time, temperature and concentration, the addition of swelling agents was studied, ie, zinc chloride, PVP, ethylene carbonate (US Patent 2,654,652 assigned to DuPont), dimethyl formamid, modified phenol derivative (Carolid), and modified self-emulsifiable solvent (Tanavol).

An evaluation of the results obtained from these trials revealed several of the chemicals had promise. From these, ethylene carbonate was selected for our further work in the development of a continuous procedure for the dyeing of this blend.

In our concept, we indicated that our procedures must adequately produce the tan, gray and forest green shades. The aforementioned individual dyestuff classes produced the light shades; however, the forest green was not satisfactorily obtainable. Laboratory tests were conducted which would produce a procedure permitting the dyeing of all three shades. These trials culminated in a continuous procedure which is acceptable with regard to levelness, dyeing uniformity between fibers, fastness and ease of control.

PROPOSED PRACTICAL DYEING PROCEDURE

The prepared pieces are passed through a pad, which applies cationic dyes to the Acrilan, employing ethylene carbonate as a carrier. Subsequently the fabric is steamed, scoured and dried continuously prior to entering a second pad for the application of vats to the cotton.

The formulations employed for producing the three shades follow.

The cationic dyes are applied by first pasting with methanol and solublizing with water at 160°F. Methanol is used in place of acetic acid since a low pH retards the dyeing of the Acrilan. Dilute to desired padding volume and add 16 oz/gal ethylene carbonate, one oz/gal sodium acetate and two oz/gal urea. Pad at 120°F and steam for one minute at 215°F. The fabric is then rinsed and washed at 190-200°F (*5*).

The anthraquinone vats are subsequently applied by standard pad-dry, chemical pad-steam continuous operations. The dyeing formulations are as follows:

Suntan	0.053 oz/gal CI Basic Yellow 11 (CI 48055) 0.22 oz/gal Sevron Brilliant Red B 0.015 oz/gal Sevron Blue 5G 0.70 oz/gal Vat Brown AG double paste (Pr 380) 0.16 oz/gal CI Vat Green 8 double paste (CI 71050)
Gray	0.48 oz/gal CI Basic Blue 21 0.10 oz/gal Sevron Yellow 3RL 0.05 oz/gal Sevron Red GL 1.00 oz/gal CI Vat Black 14 0.06 oz/gal CI Vat Brown 1 paste (CI 70800/1)
Forest Green	1.20 oz/gal Sevron Blue 5G 1.0 oz/gal CI Basic Yellow 11 (CI 48055) 0.44 oz/gal Sevron Brilliant Red B 20.0 oz/gal CI Vat Green 3 paste (CI 69500/1) 3.33 oz/gal CI Vat Green 1 double (CI 59825/6)

Although Sevron dyestuffs were employed for our work, it is not intended to imply that they are the only cationic dyes which would satisfy these requirements.

Fabrics dyed by this procedure into the three shades were tested for fastness properties. Table IX shows how they compare with 100% cotton fabric.

SUMMARY

The physical and chemical properties of cotton and Acrilan complement each other for use in work clothing. A 50/50 blend of these fibers produces a fabric which has

TABLE IX

	Light-fastness	Crocking Dry	Crocking Wet	Chlorine	Wash tests AATCC#3 1X	AATCC#3 5X	AATCC#4 1X	AATCC#4 5X
			SUN TAN SHADE					
Commercial standard All cotton	5-6	5	4-5	4-5	4-5	4-5	4-5	4-5
50% Cotton/50% Acrilan Continuous—Cationic—Vat	5	5	4-5	4-5	4-5	4-5	4-5	3-4
50% Cotton/50% Acrilan Continuous—All vat	6	5	4-5	4-5	4-5	4-5	4-5	4-5
50% Cotton/50% Acrilan Sulfur	4	4-5	3-4	NS	3-4	3	NS	NS
			GRAY SHADE					
Commercial standard All cotton	5-6	5	5	4	5	4-5	4-5	4-5
50% Cotton/50% Acrilan Continuous—Cationic—Vat	6	5	4-5	4	5	4-5	4	4
50% Cotton/50% Acrilan Continuous—All vat	6	5	5	4	5	4-5	4-5	4-5
50% Cotton/50% Acrilan Sulfur	4-5	4-5	3-4	NS	4	3	NS	NS
			FOREST GREEN SHADE					
Commercial standard All cotton	8	5	4	4-5	4-5	4-5	4-5	4-5
50% Cotton/50% Acrilan Continuous—Cationic—Vat	6-7	4	3-4	4-5	4-5	4-5	4	4
50% Cotton/50% Acrilan Sulfur	4	3-4	2-3	NS	3	3	NS	NS

greater acid resistance than 100% cotton, more rapid drying properties, at least four times the abrasion resistance, and better wrinkle recovery coupled with neater appearance. Our paper does not include finishing procedures, but it can be expected that modifications in these comments will take place in the finished piece.

This fabric can be continuously processed on conventional cotton equipment. The principal reason why conventional cotton techniques required modification is the susceptibility of Acrilan to strongly alkaline conditions at high temperatures.

Figure 3

These modifications resulted in a shorter processing time and hence a lower cost.

Remaining within the limit set precluded our investigating the possibilities and effects of innumerable other chemical, time and temperature conditions. The submitted processing sequence is a way of satisfactorily processing this fabric. Future work on this and similar blends will undoubtedly disclose other procedures, possibly at a lower cost; and quite likely improvements in the techniques for wet processing 100% cotton will also eventuate.

Processing both the fabrics through a tailoring house presented no abnormalities with regard to cutting, sewing or pressing.

The practicability of manufacturing the blend fabric is evident. The financial aspects also favor the blend. The blend fabric costs approximately 60% more to manufacture; however, its resistance to acid and, estimating tripling the wear life, based on abrasion test results, permit a net saving of 50%. Figure 3 shows a comparison of two such fabrics.

The benefits do not accrue solely to the manufacturers. The rental laundries gain because of the following attributes:

1) The fabric is more hydrophobic and dries in less than one-half the normal time.
2) The reduced damage from acid eliminates the need for sewing patches. The added abrasion and tear resistance also add to this.
3) The improved wrinkle recovery minimizes the number of pressings required or at least affords easier pressing.

The development of scouring, bleaching, mercerizing and dyeing techniques for a fabric constructed to meet certain specifications without requiring special equipment or machinery was the object of this paper. The results indicate that this has been accomplished. As mentioned in the text, the unlimited areas of exploration which were encountered should stir the minds of interested persons and produce a reservoir of added knowledge to assist both the blend and 100% cotton manufacturer.

ACKNOWLEDGMENTS

The Committee wishes to acknowledge with sincerest appreciation the contributions made by the following:

B K Easton, Food Machinery and

Chemical Corp, Becco Chemical Division, for his work and comments regarding the bleaching of this blend.

B H Nicholiason, Olin-Matieson Chemical Corp, for his observations on the continuous bleaching with Textone.

J Lindsay and the senior class at Clemson College for their experimental work and evaluations on mercerizing this fabric.

Riegel Textile Corp and Oceola Finishing Co for the practical processing permitted in their plants.

The dyestuff laboratories of E I duPont de Nemours & Co, Inc, Geigy Chemical Corp, General Dyestuff Co, Koppers Co, and National Aniline Div.

B Ajdukiewicz, W Holzer and R Landry of The Chemstrand Corp.

TRADEMARKS

Registered trademarks used in this paper are as follows: Acrilan (The Chemstrand Corp); Textone (Olin-Mathieson Chemical Corp); Calgon (Calgon, Inc); Carolid, Tanavol (Tanatex Chemical Corp); and Sevron (E I duPont de Nemours & Co, Inc).

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(1) Feldmann and Easton, "Continuous Bleaching of Cottons with Silicate-free Peroxide Solutions", *Am Dyestuff Reptr 44*, No. 22, P745-8 (October 24, 1955).

(2) Hindle, "Considerations on Dyeing Acrilan", *ibid 45*, No. 2, P34-7 (January 16, 1956)

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(6) Hadfield and Sokol, "Dyeing of Acrilan Acrylic Fiber", *J Soc Dyers Col* (September, 1958).

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(9) Mueller, "Ueber das Faerben synthetischer Fasern mit Kupfenfarbstoffen in unveresterter und veresterter Form", *ibid* (September, 1957.

Elected Members

No designation after name indicates Senior
(A) indicates Associate
(J) indicates Junior
(S) indicates Student
* indicates transfer from another class of membership

October 7, 1959

NEW ENGLAND REGION

RHODE ISLAND SECTION

Anthony P Chavent (A)

CENTRAL ATLANTIC REGION

METROPOLITAN SECTION

Richard K Berta
Richard C Newton (J)

SOUTHERN REGION

PIEDMONT SECTION

Thomas C Norman
Donald C Waterman

SOUTH CENTRAL SECTION

John G Fisher
David J Wallace
Joe H Wheeler (A)

SOUTHEASTERN SECTION

Edward M Bennis

Boleslaus M Kopacz
Leopold Loeb

WESTERN REGION

MID-WEST SECTION

Floyd E Tracy
*Burton A Gale**

October 21, 1959

NEW ENGLAND REGION

WESTERN NEW ENGLAND SECTION

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WASHINGTON SECTION

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Richard L Meek

WESTERN REGION

MID-WEST SECTION

Paul A Majors
Harlan T Fallstad

PACIFIC SOUTHWEST SECTION

Louis F Payette

AATCC Calendar

COUNCIL, COUNCIL COMMITTEES, RESEARCH COMMITTEES
Nov 19-20 (Hotel McAlpin, New York, NY) Nov 19—Council Committees and Research Committees; Nov 20 (AM)—ECR, TCR; Nov 20 (PM)—Council
Jan 21-22 (Hotel McAlpin, New York, NY); Jan 21—Council Committees and Research Committees; Jan 22 (AM)—ECR, TCR; Jan 22 (PM)—Council

NATIONAL CONVENTIONS
Oct 6-8, 1960 (Sheraton Hotel, Philadelphia, Pa); Sept 28-30, 1961 (Buffalo, NY); 1962 (Southern Region)

DELAWARE VALLEY SECTION
Dec 4 (Philadelphia, Pa)

HUDSON-MOHAWK SECTION
Nov 20 (Jack's Restaurant, Albany NY); Jan 15, Mar 27 (Chelsea House, Tribes Hill, NY); May 20 (Ladies Night); June 24 (Annual Outing)

METROPOLITAN SECTION
Nov 20 (Kohler's Swiss Chalet, Rochelle Park, NJ); Jan 15, Feb 19 (Hotel New Yorker, New York, NY); Mar 18, Apr 22 (Swiss Chalet); May 20 (Ladies Night—Swiss Chalet); June, 1960 (Outing)

MID-WEST SECTION
Nov 7 (Bismarck Hotel, Chicago, Ill)

NIAGARA FRONTIER SECTION
Dec 11 (Annual business meeting, Buffalo, NY)

NORTHERN NEW ENGLAND SECTION
Dec 4 (Joint symposium with ASME Textile Engineering Div, Smith House, Cambridge, Mass); Jan 15 (Woodlawn Golf Club, Newton, Mass)

PIEDMONT SECTION
Jan 22-23 (Poinsett Hotel, Greenville, SC); Apr 2-3 (Hotel Robert E Lee, Winston-Salem, NC); June 3-4 (Outing—Ocean Forest Hotel, Myrtle Beach, SC); Sept 23-24, 1960 (Hotel Charlotte, Charlotte, NC)

RHODE ISLAND SECTION
Dec 4 (Annual Meeting—Johnson's Hummocks Grille, Providence, RI); Jan 29 (Johnson's Hummocks); Mar 25 (Providence Engineering Soc); Apr 29 (Student Night); June 24 (Outing—Metacomet Country Club; Sept 23, 1960 (Management Night); Oct 28, 1960 (Providence Engineering Society); Dec 2, 1960 (Annual Meeting—Johnson's Hummocks)

SOUTH CENTRAL SECTION
Feb 7 (Hotel Patten, Chattanooga, Tenn); May 13-14 (Outing—Riverside Hotel, Gatlinburg, Tenn); Sept 10; Dec 9, 1960 (Hotel Patten, Chattanooga, Tenn)

SOUTHEASTERN SECTION
Dec 5 (Atlanta Athletic Club, Atlanta, Ga); Feb 20 (Ida Cason Callaway Gardens, Pine Mountain, Ga); Apr 16 (Atlanta Biltmore Hotel, Atlanta, Ga); June 10 (Outing—Radium Springs Lodge, Radium Springs, Ga); Sept 17, Dec 3, 1960 (Atlanta, Ga)

WESTERN NEW ENGLAND SECTION
Dec 4 (Hartford, Conn)

WASHINGTON CONVENTION ATTRACTS 1680 REGISTRANTS

THE attractiveness of an outstanding technical program, an extensive exhibition, and the general setting in the Nation's Capitol provided the impetus to make this year's AATCC Convention—the Association's thirty eighth—one its most successful.

An impressive advance registration approximating 1500 was indicative of the general interest on the part of a large segment of the membership, and a total registration of 1680 was announced at the Annual Banquet. An international flavor was provided by a large contingent of foreign members and guests.

Under the auspices of the Southern Region, the 1959 Convention was held in Washington for the first time. The entire program was held at the Sheraton Park Hotel; however, the facilities of the Shoreham Hotel were also employed to accommodate the large number of AATCC Convention-goers.

An innovation of the Convention format was the Awards Luncheon, which featured the presentations of the Olney Medal, the American Dyestuff Reporter Award, and the new Harold C Chapin Service Award. The Olney Award previously has been presented at the annual Olney Luncheon. Details of the Awards Luncheon will be found on pages 48-50.

Leonard Smith and Nelson F Getchell, chairman and deputy chairman respectively, headed the Convention Executive Committee, which included the following: Joseph C King, Robert B Hallowell, Ernest V Helms, assistant chairmen; Anthony M Schwartz, dining; Louis R Mizell, finance; John W Howard, entertainment, George P Fulton, Exhibits; Joseph R Wiebush, hotel reservations; Esther L Batchelder, ladies program; John C Cook, printing; Ralph L Carr, reception; Robert T Graham, registration; Arnold M Sookne, technical program; Edward C Oliva, tours; and George Lourigan, transportation.

Early arrivals on Wednesday, October 7, were permitted to view the Exhibition, which was opened in the afternoon with appropriate ribbon-cutting ceremonies. More than 30 exhibitors combined to offer a comprehensive display of products and services of interest to those attending the Convention. Many exhibitors indicated that the interest shown in their respective exhibits was the best they had ever known for an AATCC Convention, and expressed general satisfaction with the results.

This year's technical program was again condensed into a two-day presentation of three symposia and the Intersectional Contest.

Symposium I, "Wash and Wear", held Thursday morning, October 8, was moderated by Paul B Stam, J P Stevens & Co, Inc. It featured the following papers: "The Consumer's Point of View" by Genevieve M Smith, Sears, Roebuck and Co; "Man-made Fibers for 'Wash-and-Wear'" by James R Bercaw, E I duPont de Nemours & Co, Inc; "Progress in 'Wash-and-Wear' Wool" by John F Krasny and John Menkart, Harris Research Laboratories; "Man-made Cellulosic Fibers in 'Wash-and-Wear'" by A B Hilton, G V Lund, and A E Martin Jr, Countaulds (Alabama) Inc; and "Retrospect and Prospect: Progress and Problems in 'Wash-and-Wear'" by Pauline B Mack, Texas Woman's Univ.

Symposium II, "Dyeing and Finishing of Blends", was held Thursday afternoon with James E Greer, Burlington Mills Corp, serving as chairman. The following papers were presented: "Recent Developments in Finishing of Dacron Blends" by Paul L Meunier, E I duPont de Nemours & Co, Inc; 'Techniques for Union Dyeing Blends of Zefran and Cotton with Vat Dyes" by R L Burgess, Dow Chemical Co; and "Dyeing and Finishing of Special Blends of Arnel with Acrylics or Cotton in Circular Knit Applications" by Ralph E Lacy and Jack A Dayveault, Celanese Corp of America.

Fred Fortess, Celanese Corp of America, served as moderator for the third symposium, "New Dyeing and Finishing Processes", which was held Friday morning. The following five papers were featured: "Recent Advances in the Pressure-Beam Dyeing

Shown participating in ribbon-cutting ceremonies which officially opened the 1959 AATCC Exhibits are, l to r: George P Paine, executive secretary; Leonard Smith, Convention chairman; Edward Artim, national publicity chairman; George O Linberg, past president; Joseph H Jones; George P Fulton, chairman, Convention Exhibits Committee; John C Cook, chairman, Convention Printing Committee; Arthur R Thompson, national treasurer

An international flavor was provided at the Washington Convention by a number of distinguished overseas visitors, in addition to a large contingent from Canada and Mexico. Shown with AATCC President Weldon G Helmus (sixth from left) are, l to r: Petru Dobra, Asit Co, Bucharest, Romania; Valerin Rusanovschi, Asit Co, Bucharest, Romania; Menachem Lewin, Institute for Fibers and Forest Products Research, Jerusalem, Israel; Francisco P Folgueira, Productos Anilinas Americanas de Cuba, SA, Ayestaran, Cuba; Ora Virginia Degeus, Netherlands; Arthur J Farnworth, CSIRO, Melbourne, Australia; Dr Rath, Tuebingen, Germany; Elis Sjoklint, Boras Wafveri, Boras, Sweden

INTERSECTIONAL CONTEST PRINCIPALS—Standing, l to r: Thomas J Gillick Jr, Intersectional Contest chairman; A Henry Gaede, master of ceremonies. Seated, l to r: George H Lourigan, chairman-speaker, Washington Section; William Postman, chairman-speaker, Southeastern Section; William F Brommelsiek, speaker, South Central Section; William E Aldrich, chairman-speaker, Rhode Island Section; Victor S Salvin, chairman-speaker, Piedmont Section; Daniel Frishman, chairman-speaker, Northern New England Section; Joseph J Benischeck, chairman-speaker, Delaware Valley Section

PANEL FOR SYMPOSIUM ON "NEW DYEING AND FINISHING PROCESSES"—L to r: unidentified; J C Roehl, A Monforts Machine Works; J J Iannarone Jr, E I duPont de Nemours & Co, Inc; Fred Fortess, Celanese Corp of America, moderator; Arnold M Sookne, Harris Research Labs, AATCC technical program chairman; Walter J Newcomb, Gaston County Dyeing Mchine Co; Robert M Lesh, Northern Dyeing Corp; Bernard K Easton, Food Machinery and Chemical Corp

PANEL FOR SYMPOSIUM ON "WASH AND WEAR"—L to r: Paul B Stam, J P Stevens & Co, Inc, moderator; Pauline B Mack, Texas Woman's Univ; Genevieve M Smith, Sears, Roebuck and Co; A E Martin Jr, Courtaulds (Alabama) Inc; James R Bercaw, E I duPont de Nemours & Co, Inc; John Menkart, Harris Research Labs

PANEL FOR SYMPOSIUM ON "DYEING AND FINISHING OF BLENDS"—L to r: R L Burggess, Dow Chemical Co; Paul L Meunier, E I duPont de Nemours & Co, Inc; Ralph E Lacy, Celanese Corp of America; Henry H Latham, Arkansas Co

of Synthetic Fabrics" by Walter J Newcomb, Gaston County Dyeing Machine Co, and George C Ward, Celanese Corp of America; "Twelve Million Yards of Natural and Man-made Fibers Dyed on the Swedish Pad-roll Dyeing Machine" by Robert M Lesh, Northern Dyeing Corp; "Present-day Trends in Bleaching" by Bernard K Easton, Food Machinery and Chemical Corp; "The Monforts Reactor—A New Continuous Dyeing Machine" by Joachim Roehl, A Monforts Maschinenfabrik; and "Dyeing Blends of Dacron Polyester Fiber and Cotton by the Thermosol Process" by J J Iannarone Jr and William Wygand Jr, E I duPont de Nemours & Co, Inc.

One of the most successful programs in the 20-year history of the Intersectional Contest was held on Friday afternoon with seven Sections offering papers. A Henry Gaede, Laurel Soap Mfg Co, served as master of ceremonies. First prize went to the Northern New England Section for its paper on "Pile Fabrics". The Piedmont Section, winner of the three previous Contests, took second-place honors with its entry, "Accelerant Dyeing of Hydrophobic Fibers—Principles and Mechanisms". Third place went to the Delaware Valley Section for its paper, "Fluorescent Brighteners and Bluing Agents in Wool Processing". The other four entries were as follows: "A Study of the Removal of Metal Ions from Cotton Fabrics" by the Rhode Island Section; "The Continuous Wet Processing of Cotton-Acrilan Work-Clothing Fabrics", South Central Section; "Dyeing with Direct Dyes—The Effect of Various Salts", Southeastern Section; and "'Wash-and-Wear' Ratings: Subjective and Objective", Washington Section.

An outstanding program for the ladies, under the direction of Esther L Batchelder, featured conducted tours of Washington, a visit to the White House, and a "get-acquainted" luncheon and fashion show.

The Annual Banquet was held on Friday evening, with Convention Chairman Leonard Smith serving as toastmaster. Highlights of this affair included AATCC President Weldon G Helmus' "State of the Union" message (the text of which appears elsewhere in this issue), the announcement and presentation of awards for Intersectional Contest winners by IC Chairman Thomas J Gillick; and presentation of the Past President's Award to George O Linberg by President Helmus. Those attending the Banquet were treated to

Ladies "get acquainted" luncheon and fashion show

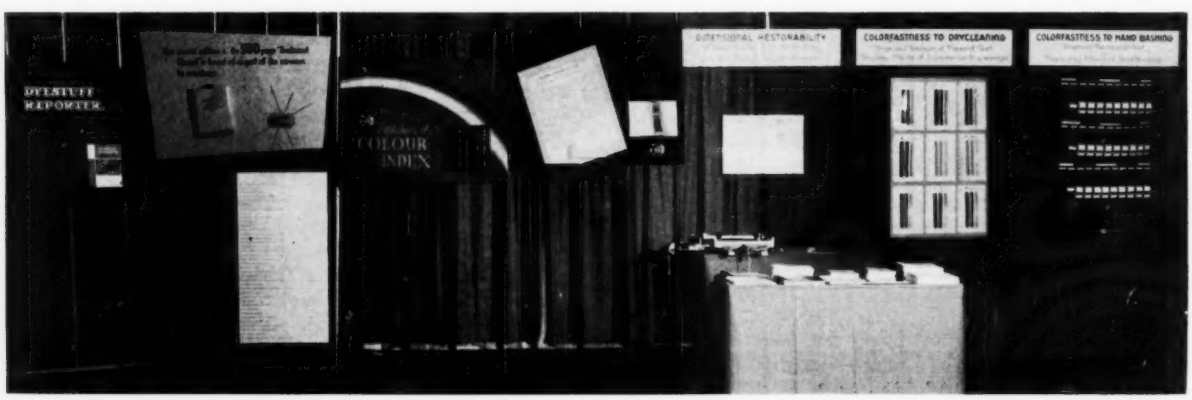
HEAD TABLE—LADIES LUNCHEON AND FASHION SHOW—L to r: Mrs George P Paine; Mrs Elliott Morrill; Mrs Weldon G Helmus; Esther L Batchelder, chairman, ladies program

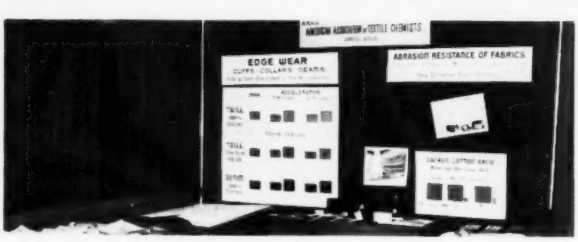
HEAD TABLE—LADIES LUNCHEON AND FASHION SHOW—L to r: Mrs H Gillespie Smith, Mrs W George Parks, Mrs Arthur R Thompson

a program of top-flight professional entertainment.

The entertainment phases of the Convention continued over the week-end with a Saturday morning golf tournament at the University of Maryland golf course, a college football game between Maryland and Wake Forest on Saturday afternoon, and a professional football game between Washington and the Chicago Cardinals on Sunday.

Those attending the Convention were welcomed to the nearby facilities of the National Institute of Drycleaning, the National Bureau of Standards, and the Harris Research Laboratories. Many also attended the Eighth Chemical Finishing Conference, sponsored by the National Cotton Council, on October 7.





Views of the AATCC exhibit at Washington Convention

HEAD TABLE—ANNUAL BANQUET (Left side)—L to r: Martin J Lydon, president, Lowell Technological Institute; Mrs G P Paine; George P Paine, executive secretary; Charles W Dorn, chairman, Executive Committee on Research; Mrs H G Smith; H Gillespie Smith, vice president (Southern Region); C T Anderson, vice president (Central Atlantic Region); Mrs W G Helmus; Weldon G Helmus, president; Mrs L Smith; Leonard Smith, 1959 Convention chairman

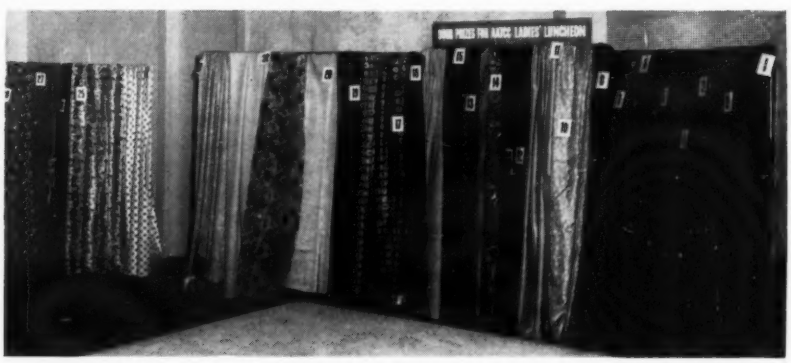
HEAD TABLE—ANNUAL BANQUET (Right Side)—L to r: Mrs E Morrill, Elliott Morrill, vice president (Western Region); Mrs W G Parks; W George Parks, vice president (New England Region); Thomas J Gillick Jr, chairman, Intersectional Contest; Mrs G O Linberg; George O Linberg, past president; Ernest R Kaswell, chairman, Conventions Committee; Mrs A R Thompson; Arthur R Thompson, treasurer

Weldon G Helmus delivering President's Address at Annual Banquet

INTERSECTIONAL CONTEST AWARDS—President Weldon G Helmus (left) presents check to Kevin L McChesney, chairman, Delaware Valley Section, for the Section's third-place finish in this year's Contest. Also shown are Daniel Frishman (third from left), chairman, Northern New England Section Intersectional Contest Committee, who accepted check for first place, and Victor S Salvin, chairman, Piedmont Section Intersectional Contest Committee, who accepted check for second place

Convention chairman Leonard Smith served as toastmaster at Annual Banquet

Thomas J Gillick Jr, chairman, announces results of 1959 Intersectional Contest at Annual Banquet



Various fabrics donated by Corporate Members of AATCC were awarded as door prizes for the Ladies' Luncheon

PRESIDENT'S ADDRESS*

WELDON G HELMUS

MR CHAIRMAN, distinguished guests, members of AATCC, Ladies and Gentlemen:

This is the one time of year that I have the privilege of addressing a full assemblage of our Association and I would like to give you a very brief report on our state of affairs.

First, let me say that it is very good.

When I took office on January 1, 1959, I came into the presidency of an organization of which we can all be proud. In a few short weeks, I quickly grasped the fact that being president was not an easy job. The obligations of that office to the members, the sections, the many committees, the Council and to the industry which our association serves impressed me with the responsibilities for which your president is accountable.

I was fortunate in having such a predecessor as George O Linberg, who, during his administration, had instituted many fine programs. As a continuing reminder to him of the many contributions he made to AATCC in 1957 and 1958, I now want to present to him this certificate, which reads as follows:

"THE AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS SALUTES GEORGE O LINBERG IN RECOGNITION OF HIS WISDOM, GUIDANCE AND LEADERSHIP AS PRESIDENT, 1957-1958. PRESENTED AT THE AATCC NATIONAL CONVENTION, WASHINGTON, DC."

I think this came as a surprise to George as I am sure he has forgotten by now that he did the same thing not only for his immediate predecessor, but for all past presidents. It is a nice custom and I think it should be continued.

My report to you will touch on the Association's finances, the progress we have made in aligning its administrative organization with its operating requirements, accomplishments in the research and technical programs and our relations with similar associations in other countries.

President Weldon G Helmus (left) presents certificate to Past President George O Linberg at Annual Banquet

I am happy to report that, at the end of our fiscal year on July 31, 1959, we showed a healthy surplus of $21,806.13. Through careful management and economical operations, our expenditures are about $10,000 under the budget which had been authorized by the Council. On the income side, the dues from members, both individual and corporate, remained at the same level as the previous year. I am hopeful that the Corporate Membership Committee and the newly-formed Committee on Individual Membership will enable us to show a substantial increase in dues income at the end of this year. Our balance sheet on July 31st showed total assets of $558,374.68, which represent an increase of some $42,000 over the previous year. Speaking as a businessman, I can assure you that your association is financially sound. It holds sufficient reserves to underwrite operations for a three-year period if its present level of operations were maintained. It is important, however, that we remain financially fluid and flexible in order that we may always be in a position to utilize the funds we hold in trust for the members for services and benefits to which they are entitled.

These funds belong to the members. The officers and the Councilors are administering them with the same rules of prudence they would apply to the management of their personal affairs.

Directly related to financial matters is the manner in which the business of the association is run. Our Association has become *big business* as associations go and it must apply modern management practices and attitudes to its operations. To this end, the Council, at its April meeting, voted to create an Executive Committee to assume administrative and management responsibilities which formerly had fallen on the shoulders of the president. The voting membership of this committee is made up of the president, the four regional vice presidents, the treasurer and immediate past president. The chairman of the Executive Committee on Research and the executive secretary are members without vote. The sections, therefore, through their regional vice presidents, now have an even more direct voice in the management of the Association. The immediate past president and the executive secretary contribute continuity to the Committee. Furthermore, this continuity is maintained by the fact that, in a body of this size, there is never a complete turnover from year to year. But most important of all, it pinpoints the administrative and management responsibilities and authorities on an official body of officers elected by the members or appointed by the Council. With a Council of sixty, the Executive Committee can be of great assistance in making studies, investigations and recommendations which cannot otherwise be undertaken in an orderly fashion in a body of this size.

Early this year—shortly after taking office—I made a statement to the membership concerning rumors. My statement was published in the *American Dyestuff Reporter*, but I feel so strongly on this point that I would like to repeat it. I said, in effect, that if *any* of our 7,000 members had any questions or opinions concerning the way the Association was being run, I would appreciate it

* Presented October 9, 1959 at the Annual Banquet during the 38th National Convention held at the Sheraton Park Hotel, Washington, DC.

if they would come to "home plate" for information, namely, to address either me as president or contact the executive secretary at the Association's National Headquarters to get the facts. On several occasions, I have found that so-called "official information" has been *misinformation*, usually because it was obtained from an unofficial source. If there is a policy matter concerned, it will be reviewed by the Executive Committee and, if necessary, by the Council, and I promise you will get an *official* answer.

I can report to you that our committees are making splendid contributions to the Association and to the industry. We have twenty-five committees of the Council plus forty research committees giving their time and effort to the welfare and progress of our Association.

A number of important and significant accomplishments have been achieved by these committees during the past year, and there are several more committees nearly ready to offer their conclusions to the Council.

To give you just a few examples of the achievements to date: the Study Committee on the Location of National Headquarters, after an intensive investigation, has recommended that we remain in our present location. Since our "landlord", President Martin J Lydon of Lowell Technological Institute is sitting at this table, I want to express, on behalf of the Association, our appreciation for the Institute's hospitality in making space available for our national headquarters. I understand the new building is progressing well and that, within the next year, we will move into a wing where our staff and headquarters facilities will be self-contained in a single unit. You would be pleased to see this modern, well-designed building which will efficiently accommodate our various functions, and I hope that, when we are resettled in our new home, many of you will have the opportunity to drop in and see it for yourselves.

The Study Committee on Nominating Procedures has established a more orderly and workable method of selecting candidates for national office.

Another study committee has brought into being the Harold C Chapin Service Award, the first of which we were proud to present to Dr Chapin yesterday. The Publications Committee has been reorganized and strengthened in establishing three active subcommittees; an editorial board of the *Technical Manual*, Vat Monograph Marketing Committee, and the *Colour Index* Supplement Editorial Committee. The Study Committee on Long-Range Objectives will shortly have a report and recommendations; as will the Employee Retirement and Pension Committee. We also have proposed a constitutional amendment limiting the term of presidency to two years, which I heartily endorse.

The Research Committees are covering a broad and comprehensive program. In order to give you another perspective of our research and technical program, I would like to quote from some remarks made by the chairman of the Technical Committee on Research before a joint meeting of the Council and the Quebec Section of the Canadian Association of Textile Colourists and Chemists held in Montreal this past May. He said,

> "Too often we tend to take a good thing for granted, and AATCC is a *good* thing. Its test methods are an integral part of the textile industry. Sometimes I wonder if we really appreciate the fact that practically all of the dyes, finishes and many chemicals produced in the United States are controlled and checked by the use of AATCC test methods. And these same AATCC test methods are a major factor in insuring the satisfactory consumer performance of the billions of yards of textiles that find their way across the retail counter and into the hands of Mr and Mrs United States."

Our national headquarters, under the direction of our executive secretary, is giving active support to many of our committees. Although the size of our staff has been steadily reduced, the general operations have been tightened up, so that today we are getting an increasingly better return from the services rendered by the national headquarters offices. I might add that, in May, the Council reappointed George P Paine as our executive secretary. Mr Paine has had three years to become acquainted with AATCC and we have had the same time to get to know him. I hope he will continue to find his job a rewarding and satisfying one. With the possible exception of his secretary, I don't believe anyone can appreciate the amount of work, time and energy Mr Paine puts into his job for our good. I personally feel that we could not find a man better qualified to handle the office he holds.

One of the most important things we have done this year is to make some real progress in solving some of the complicated and perplexing problems concerning the *Colour Index*. In 1952, AATCC entered into a partnership agreement with the Society of Dyers and Colourists to publish this four-volume, 3,000-page reference work, which, it was estimated, would cost around a quarter of a million dollars. While the editorial content was assembled in a cooperative effort, the actual publishing responsibilities were assumed by the British Society.

The difficulties in reaching mutually satisfactory conclusions by mail in financial matters, the distance involved, the differences in the laws of England and the United States, among other handicaps, had resulted in a situation which could not be resolved by correspondence. For AATCC, nearly $150,000 was involved. So to clarify the issues and protect our investment, it seemed advisable for representatives of the Association and the Society to sit down together and talk the problems out.

Our distinguished past president and Olney Medalist, William D Appel, and our executive secretary, George Paine, were directed to go to England in the hope that solutions to the many problems could be reached. Because of Mr Appel's knowledge of the editorial aspects of the project and Mr Paine's familiarity with the the financial and contractual details, it was felt that their combined information and experience would result in the best possible representation for AATCC. They were supported by the London office of our auditing firm, Price Waterhouse & Co. The preliminary reports of their mission, which I have heard, indicate that it was even more successful than we had hoped. Mr Appel and Mr Paine developed and presented a proposal to SDC which will be mutually profitable to the two societies. They returned from England less than two weeks ago and will make their full and formal report to our Publications Committee, which will meet shortly.

As a result of these personal contacts we have an added dividend which cannot be measured in dollars or pounds sterling. This is the advent of a renewed era of understanding and good will between our two societies.

(concluded on page 52)

1959 Annual Convention———

VALKO, CHAPIN AND WILLIAMS HONORED AT AWARDS LUNCHEON

EMERY I Valko, Harold C Chapin, and Charles R Williams were honored at the recently concluded Washington Convention during the first Awards Luncheon, which was held at the Park Sheraton Hotel, Washington, DC, at noon on October 8 in the Main Ballroom.

Departing from precedent, which called for a luncheon honoring the Olney Medalist, this year's Convention Committee arranged for a luncheon honoring not only the Olney Medalist (Dr Valko), but also the recipients of the newly established Harold Canning Chapin Service Award (Dr Chapin) and the annual American Dyestuff Reporter Award (Mr Williams).

Elliott Morrill, AATCC vice president representing the Western Region, served as master of ceremonies in place of Weldon G Helmus, AATCC president, who was unable to be present.

AMERICAN DYESTUFF REPORTER AWARD—Mr Morrill introduced Charles R Williams, research chemist in the Textile Laboratory, Plastics Division, Monsanto Chemical Co, Springfield, Mass, as the winner of the 9th American Dyestuff Reporter Award. This Award was endowed by the Howes Publishing Co, Inc, as a memorial to Alfred P Howes, founder of the *American Dyestuff Reporter*. Its purpose is to encourage the presentation of the best possible papers before local and national meetings of the Association. The Award, $200 annually, is presented to the author of authors of the paper considered best in the opinion of the judges. Any technical paper presented before a local or national meeting of the AATCC and published in the *Proceedings* is eligible with the following exceptions: Intersectional Contest papers, papers by employees of the AATCC, reports of work substantially subsidized by AATCC, or reports of research committees. It is a condition of eligibility that the paper have its first publication in the *Proceedings*. Papers published in the *Proceedings* from July 1st of one year to June 30th of the next year are considered in each judging period.

AWARDS LUNCHEON—Left side of dais, l to r: George P Paine, executive secretary, AATCC; Paul L Meunier, chairman, Olney Medal Committee; Mrs Charles R Williams; Charles R Williams, American Dyestuff Reporter Award recipient; Mrs Emery I Valko; Emery I Valko, 1959 Olney Medalist; Elliott Morrill, AATCC vice president, master of ceremonies

AWARDS LUNCHEON—Right side of dais, l to r: Mrs Harold C Chapin; Harold C Chapin, Harold Canning Chapin Service Award recipient; George O Linberg, chairman, Service Award Committee chairman; Arthur R Thompson, national treasurer, AATCC; Myron D Reeser, vice president, Howes Publishing Co, Inc; Leonard Smith, 1959 Convention chairman

Judges for this years' ADR Award, namely, Hector C Borghetty, chairman, Carl Z Draves, and Paul B Stam, selected as the winning paper Mr Williams' "Mechanisms Influencing the Wash and Wear Characteristics of Cellulosic Fibers", which appeared in *American Dyestuff Reporter*, Vol 48, No. 13, pages 27-30, 39, issue of June 29, 1959.

Mr Wlliams holds a BS ChE from Northeastern University, and pursued graduate work in physical chemistry of high polymers at the University of Massachusetts. He joined Monsanto in 1953 where his fields of endeavor have included aminoplast resin chemistry and cellulose reactions, cotton and rayon finishing, aminoplast catalysis, thermoplastic latices, water-soluble synthetic resins, and filament yarn sizing.

An author of technical papers and patents primarily in the area of cellulosic fabric finishing technology, Mr Williams pioneered concepts and methods of appearance evaluation in present use of "wash-and-wear" testing, which were pertinent to the ADR Award-winning article. He is an active member of AATCC's Wash and Wear Committee, and has served also on its Committees on Antistatics and Durable Finishes.

An addition to his AATCC membership, Mr Williams is a member of the American Chemical Society and Tau Beta Pi, honorary engineering fraternity.

In accepting the ADR Award, Mr Williams responded as follows:

"Mr Chairman, Honored Guests, Ladies and Gentlemen,

"To each of you, to the American Association of Textile Chemists and Colorists, and to the publishers of the *American Dyestuff Reporter*, I wish to express my heartfelt appreciation for being so honored. The excitement and exhilaration I feel in receiving this award is so overwhelming, that I cannot adequately speak to this occasion. This shall always be a treasured occasion in my life.

"Reflection upon the meaning of this award places such a clarity upon a single thought that I would like in a few brief moments to share it with you. In honoring an individual, on the basis of a single accomplishment, superficially the value and the benefit of this award appears to concentrate with the recipient. To consider this to be so, or to receive it as such, would be a total failure to understand the broader value to all of us that is the true meaning and intent of this award. This broader value lies within the purpose for which it was endowed by the Howes Publishing Company, Inc, which was to exemplify and stimulate the tech-

nical proceedings of the American Association of Textile Chemists and Colorists—an objective to reward not one, but everyone of us.

"We know the tremendous size of the textile industry, and its importance to this nation and its way of life. We also recognize that, like other industries, it is in, and dependent upon, a continuing technological revolution. Furthermore, the strong current of optimism, so obvious in the preceding technical sessions, reflects full well the future growth this technology holds in store. Because of this, it is apparent that the American Association of Textile Chemists and Colorists will be of even greater importance in the future, to its members, to the textile industry, and to the nation.

"The growth, stature, and accomplishment of the American Association of Textile Chemists and Colorist is the product of the individual contributions of its members. And as each member has contributed, so has each member benefited immeasurably more from this association. This award promotes these ends, by symbolizing the many contributions of all its members, and by benefiting each of us through stimulus and incentive for technical contributions within the American Association of Textile Chemists and Colorists. It is therefore, in its truest sense, made to all of us.

"Personally, I have benefited, before this award, in greater measure than by whatever my contributions may have been. I am now rewarded beyond all expectation.

"I can only accept with pride, and with humility, the American Dyestuff Reporter Award. Thank you."

OLNEY MEDAL AWARD—Emery I Valko, associate professor of chemistry, Lowell Technological Institute was presented to the audience as the 16th Olney Medalist by Paul L Meunier, representing the Olney Medal Committee. Dr Meunier spoke briefly on the Medalist's career, calling attention to the article on Dr Valko which appeared on pages 109-113 of the September 21st *American Dyestuff Reporter*.

Dr Valko, in accepting the Olney Medal, responded as follows:

"Chairman Morrill, Dr Meunier and members of the Olney Award Committee, fellow members of the American Association of Textile Chemists and Colorists, guests:

"It is with great pleasure and deep appreciation that I accept the Olney

OLNEY MEDAL PRESENTATION—Paul L Meunier (left), chairman of the Olney Medal Committee, presents 16th Olney Medal Award to Emery I Valko (right), during Awards Luncheon as Mrs Valko and Elliott Morrill, master of ceremonies, look on.

Medal. The distinguished roster of former recipients bears testimony for the great honor it signifies. These are men whose accomplishments I hold in high esteem. To join their ranks fills me with pride.

"Like my predecessors, upon whom this honor has been bestowed, I have devoted most of my working time to textile chemistry, its theory and practice. Textile chemistry held me in its spell because it afforded me an inexhaustible opportunity for the interplay of reasoning and experimentation, an interplay from which I derived enjoyment and satisfaction. Like all experimentors I have known disappointments and frustration. At the end, however, I always felt richly rewarded by those great moments of triumph when the theory was proven or at least seemed to be proven; or when the blueprint of a new molecule, perhaps of a new textile finish, gave birth to a compound which performed as predicted. Sharing these great moments with my co-workers heightened my enjoyment. To them I owe my sincere gratitude.

"Textile chemistry, its theory and its practice, has always appeared to me to be on the threshold of a new epoch. The advances made in recent years certainly substantiate this and the pace is still accelerating. It was gratifying to find how the rapidly accumulating, seemingly amorphous mass of scientific information yielded to the analytical approach and could be fitted in to the framework of an organized discipline. Your generous recognition of the small part I have attempted to take in these developments makes me feel humble.

"This is a momentous event for me and if I am permitted to express purely personal emotions, I see a special significance in the coincidence that it is taking place here in Washington, the Capitol of the United States.

"In 1938, in one of the darkest hours of my native continent, I came to this city for the first time as a visitor to this country, which I am now privileged to call my country. Since that time, I associate the image of this city with the names and ideas of Washington, Jefferson and Lincoln, whose memorials adorn it.

"My pleasure in accepting this award is accompanied by some uneasiness to my worthiness. A few weeks ago I came across the words of a great scientist, uttered recently as he was honored. It happened that he quoted another scientist, who in turn quoted a third one. What this third one said, was that the honor and honors which we do not deserve, brings us the highest enjoyment as they give us an illusion: We feel that at least an element of truth must be in the selection for the honor and that makes us feel good. This is what

Harold C Chapin (left) receives Harold Canning Chapin Award from Selection Committee chairman George O Linberg during Awards Luncheon

Elliott Morrill (left), master of ceremonies at Awards Luncheon, presents American Dyestuff Reporter Award plaque to Charles R Williams, 1959 ADR Award winner

the repeatedly quoted scientist said.

"Whatever the psychology might be, your award gives me such a good feeling. It gives me reassurance and it gives me encouragement, and for that I am deeply grateful to the American Association of Textile Chemist and Colorists."

The Olney Medal is a heavy cast piece bearing a likeness of Dr Louis Atwell Olney, founder of the AATCC, on the front, and a simple inscription on the reverse side. The award is endowed by Howes Publishing Co, Inc, and is awarded by an AATCC committee to any citizen of the USA as recognition for "outstanding achievement in the field of textile chemistry, including the development of chemical agents or chemical processes used in the manufacture of textiles, or methods for their evaluation."

Details of published works and professional qualifications of those proposed each year for the medal are usually contained in nominating briefs delivered to the Awards Committee. This Committee then considers those nominated and makes a final choice.

Under rules agreed to by the Association and Howes Publishing Co, Inc, the award must be made by unanimous decision of the committee of five, which includes: the Association president (ex-officio); a member of the faculty of an educational institution awarding chemical degrees; an employee of a concern manufacturing chemical products used in textile wet processing; an employee of a concern manufacturing textiles; a member at large of the Association.

Members of this year's Olney Medal committee, in addition to Dr Meunier, are President Weldon G Helmus, *ex-officio;* Edward W Lawrence; Milton Harris, and James L Taylor.

HAROLD CANNING CHAPIN SERVICE AWARD—Harold C Chapin, past secretary and Honorary Member of AATCC, became the initial recipient of the Association's new service award, which has been designated "The Harold Canning Chapin Award". The Award is to be presented annually to a Senior Member, of at least twenty years continuous membership, who has contributed outstanding service in enabling the Association to attain the objectives for which it was founded.

George O Linberg, chairman of the Chapin Award Committee, presented to Dr Chapin the Award, which read as follows:

"American Association of Textile Chemists and Colorists. The Harold Canning Chapin Award for outstanding service to this Association is established in this year, nineteen hundred and fifty nine, in honor of Harold Canning Chapin, who, during a quarter century as Secretary, created by his example the inspiration for this Award. For outstanding leadership, for dignity and integrity in office, for indefatigable attention to minor detail and major policy, for advancing the Association's objectives, for bringing national and international prestige to the Association, and for long and devoted service, Harold Canning Chapin is herebynamed the first recipient of this annual award created in his honor. Signed: George P Paine, executive secretary; Weldon G Helmus, president".

Dr Chapin responded as follows:

"It was honor enough to have this Award named for me. I made certain suggestions regarding recipients to your committee, but they turned me down.

"In name it reminds me of the stock options which successful corporations give their officers to help them on their taxes. Mine is tax free. It brings other satisfactions which money can not buy.

"I look forward to considerable appreciation, because these awards seem to gain luster each year from their recipients. My great-grandchildren will think I was quite a fellow.

"What this really means to me is that the friendships made in years of work together are still remembered. For this I am deeply grateful."

44 PARTICIPATE IN GOLF TOURNAMENT AT CONVENTION

(All captions read left to right)

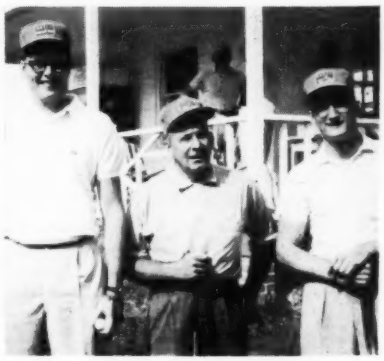
GORDON Wood, Corn Product Sales Co, Greenville, SC, took low-gross honors with a three-over-par 75 during AATCC's 1959 National Convention Golf Tournament held Saturday, October 10, at the University of Maryland's new 18-hole course.

Forty-four AATCC Convention-goers participated in the event, which was arranged by a Golf Committee consisting of Russell Gill, Arnold Hoffman & Co, Inc, chairman, E H Giard, Clearwater Finishing Co; Ried Tull, Proctor Chemical Co; and Vernon Jackson, Harris Research Laboratories.

Handicaps for low net honors were determined by dividing the field into two sections, Class AA with gross scores of 93 or better, and Class CC with scores above 93, with the club professional, Frank Cronin, picking the blind 9-hole scores for handicapping each section. Under this system prizes were awarded the following:

Armand Poitras, Dartmouth Finishing Co, 113-56-57; Don Gush, Harris Research Laboratories, 112-54-58; Al Brown, Harris Research Laboratories, 115-50-65; George Linberg, Melrose Chemical Co, 87-20-67; Warren Rixon, Union Carbide Chemicals Co, 99-32-67; John Soltis, Harris Research Laboratories, 100-32-68; Ted Giard, Clearwater Finishing Co, 83-

Standing: Ralph Greene, American Cyanamid Co; George O Linberg, Melrose Chemical Co; Gordon Wood, Corn Products Sales Co. Kneeling: Don Gush, John Soltis, and Al Brown, Harris Research Labs



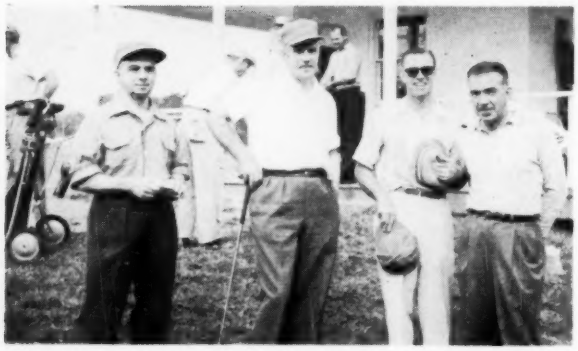
Joe Kapcznski, Anthony Schwartz, and Don Gush, Harris Research Labs

Al Brown, Harris Research Labs; R Greene, U S Govt General Services Administration; Larry Heffner, N C State College; Lou Mizell, Harris Research Labs

Armand Poitras, Dartmouth Finishing Co; Don Hallada, DuPont Co; Ted Giard, Clearwater Finishing Co; Russell Gill, Arnold, Hoffman & Co, Inc

Vernon Jackson, Harris Research Labs; George O Linberg, Melrose Chemical Co; Leonard Smith, National Cotton Council; Russell Gill, Arnold, Hoffman & Co, Inc

Ted Giard, Clearwater Finishing Co; Joe O'Neill, Riegel Textile Corp; Gordon Wood, Corn Products Sales Co; Tom McIlwain, Warwick Chemical Co



Ed Waters, ICI; Elis Sjoeklint, Boras Wafveri Aktiebolag; Ray Thornton and Russell Gill, Arnold, Hoffman & Co, Inc

John Harley, Alliance Chemical Corp; Sabi Sampson, Ingsam, SA; Charles Cooper

12-71; Don Hallada, E I duPont de Nemours & Co, Inc, 85-14-71; Lou Mizell, Harris Research Laboratories, 89-18-71 and Ralph Greene, American Cyanamid Co, 97-24-73.

A feature of the tournament was that each contestant was the recipient of an official "AATCC Golf Club" cap dyed bright red for identification in the deep woods bordering the Course.

The tournament was provided an international aspect with entrants from England (Ed Waters, Imperial Chemical Industries, Ltd), from Sweden (Elis Sjoklint, Boras Wafveri Aktiebolag), and from Mexico (Sabi Sampson, Ingsam, SA).

President's Address———

(concluded from page 47)

I am confident the meetings were very friendly.

Prior to the conference between our representatives and the officers of SDC in Bradford, Mr Appel and Mr Paine, in company with Henry E Millson, 1958 Olney Medalist, represented AATCC as an observer delegation at the London Congress of the International Federation of Associations of Textile Chemists and Colorists. About 800 people from nearly 30 countries attended the Congress. Not only did our representatives have a chance to become acquainted with the people with whom they would be dealing on *Colour Index* matters, but they had a first-hand opportunity to evaluate possible membership for AATCC in this organization. Membership in the Federation includes associations of textile chemists and colorists in France, Italy, Holland, Switzerland, Austria, Germany, Sweden and the United Kingdom. Mr Appel, as the leader of our delegation of observers, will make his report and recommendations on this phase of the trip. If I were asked, I would be hard pressed to answer why we, the largest of such Associations, are not taking active leadership in a Federation of thirty-years' standing of our fellow societies in other countries.

There is much I have not covered in the interests of being brief and I must rely on your reading of the Proceedings to fill the gaps.

I could not close without a word of appreciation for the helpful cooperation I have received from my immediate predecessor, George Linberg, from the national officers of the Association, from the many committee chairmen and members, and from the Sections. It has been most gratifying to have their support.

Nor can I close without pointing to the outstanding job done by the Washington Section and the Sections associated with it in the Southern Region, which have put on this most successful Convention. In saluting your convention chairman, Leonard Smith, I know I speak for all our members and the many wives present in paying tribute to all those who haved worked so diligently to make the 1959 National Convention of AATCC a memorable occasion.

Thank you, Ladies and Gentlemen.

All papers presented at the Washington Convention will appear exclusively in forthcoming issues of American Dyestuff Reporter

COUNCIL REPORT

216th Meeting • September 10, 1959 • New York, N Y

THE Council met for its 216th meeting on September 10, 1959 at the Sheraton Atlantic Hotel (formerly the Sheraton McAlpin Hotel), New York, NY, with President Weldon G Helmus presiding.

* * *

The resignation of Roland E Derby as treasurer was accepted, following which Council offered a resolution of thanks for service. To fill the vacancy created by Mr Derby's resignation, Council appointed Arthur R Thompson to the post.

* * *

Reporting for the Executive Committee, President Helmus stated that the report of the Study Committee on Nominating Procedures had been reviewed, and it was recommended that the Committee be discharged with thanks. Mr Helmus advised that the executive secretary had been instructed to prepare an analysis of the method of reimbursement to local sections. Mr Helmus also mentioned the possibility of reciprocal membership with other societies. The Executive Committee recommended the following in the event that a vice presiden is incapacitated: A vice president may appoint a Senior Member to act for him. If the appointed Senior Member is not in attendance at a Council meeting, the Councilors from the Region in question may designate an acting vice president.

* * *

Reporting for the Study Committee on Location of National Headquarters, Ernest R Kaswell announced that the Committee recommended that National Headquarters be maintained at Lowell Technological Institute for the forseeable future and that Council reaffirm its 1955 agreement with the Institute. It further recommended that the laboratories at national headquarters be discontinued and that a pension plan for employees and modern fringe employee benefits be established. Council voted unanimous approval.

* * *

Following considerable discussion on the report of the Study Committee on Endowment Fund (see page 57 of May 4, 1959 issue), Council voted to return the report to Committee for further study.

* * *

Elliott Morrill, chairman, Committee on Membership and Local Sections, announced that individual membership as of September 1 stood at 6945, an increase of 200 since May 1. Herbert A Stauderman, chairman of the Committee on Individual Membership, discussed plans for a new membership drive, which include a more active, coordinated program at the Section level. Mr Stauderman also outlined plans for a concerted program at the Washington Convention to make the Association more "membership conscious."

* * *

Albert E Johnson, chairman of the Corporate Membership Committee, paid tribute to the work being done at the Section level in several instances. He reported that income from Corporate Membership was running approximately $2,000 ahead of 1958.

* * *

Reporting for the Technical Committee Research as well as the Executive Committee on Research (in the absence of ECR Chairman Charles W Dorn), Charles A Sylvester stated that the two-day meeting schedule had met with enthusiasm. He advised that TCR planned to ask its committee chairmen to submit their ideas as to what the scope of their committees should be so that they can be reviewed. Committee chairmen will also be asked that, when they are ready to submit a test method or a significant revision of an existing test method for letter ballot, they prepare a report for publication in *American Dyestuff Reporter*, giving the background and work that went into the test method or revision thereof.

The Executive Committee on Research approved the following requests of TCR, all of which were subsequently approved by Council:

Submittal by letter ballot of revised test for colorfastness to drycleaning (85-1957). This revision calls for the use of a higher temperature (140°F), no soap, and simplified pressing procedure.

Proposal that Committee on Continuous Wool Scouring Processes be made a reference committee because it has completed its work and no new project has been proposed.

Motion to revise temperature requirement of Test No. 16-A, Colorfastness to Light, so as to specify a black-panel temperature of 145° ±5°F.

Motion to revise the Wash and Wear Test No. 88-1958 to:

a) Include alternate viewing procedure using Monsanto replicas.
b) Change scope of test to include special surface effects fabrics.

Motion for letter ballot of "mechanical" hand wash test contingent on formal approval by Washfastness Committee.

Request of Committee on Mercerization that it be put on an inactive status.

It was decided that no further action should be taken at present with regard to the NFPA tentative flammability test. AATCC has already taken a firm stand against the test and has withdrawn its representation from the Committee.

Council was advised that AATCC's exhibit in Washington would emphasize the Association's contributions to industry with displays featuring the work of the following Committees: Chlorine Retention, Wash and Wear, Abrasion, Washfastness, Drycleaning, and Consumer Complaints.

* * *

Thomas J Gillick Jr, chairman of the Intersectional Contest Committee, reported increased interest in the Contest, exemplified by the fact that seven Sections had entered papers this year.

* * *

For the Publications Committee, Chairman Paul J Luck reported that the Committee had approved that

William D Appel and George P Paine go to England to discuss the *Colour Index* contract with the Society of Dyers and Colourists to clear up misunderstandings in connection with the work. The Committee instructed Messrs Paine and Appel to use Mr Paine's report on the Joint Partnership as a framework for discussion with the British.

Council approved the recommendations of the Publications Committee that 1) the Colour Index Supplement Editorial Committee be discharged and that it assume the status of a subcommittee of the Publications Committee; and 2) the Bibliography Committee be discharged.

* * *

George O Linberg announced that Harold Canning Chapin would be the first recipient of the Harold C Chapin Award which has been set up in his name.

Council accepted the reports of the executive secretary and treasurer. A highlight of the latter report was the $21,806.13 surplus figure for the fiscal year ended July 31st.

* * *

General approval of the two-day meeting plan for Council and committee meetings was expressed. It was voted to cancel the proposed meeting of the Council originally scheduled at Washington during the 1959 Conventon, and in its place to hold the next meeting at the Sheraton Atlantic in New York November 20th. The subsequent meeting will also be held at the Sheraton Atlantic on January 22nd.

General Calendar

AMERICAN ASSOCIATION FOR TEXTILE TECHNOLOGY
Nov 4, Dec 2, Jan 6, Feb 3, Mar 2, Apr 6, May 4, June 1 (Della Robbia Room, Hotel Vanderbilt, New York, NY)

AMERICAN COTTON MANUFACTURERS INSTITUTE
April 7-9 (11th Annual Meeting Americana Hotel, Bal Harbour, Miami Beach, Fla); Mar 23-25 (12th Annual Meeting, Fontainebleau Hotel, Miami Beach, Fla)

AMERICAN SOCIETY FOR QUALITY CONTROL, TEXTILE DIVISION
Feb 18-19 (10th Annual Conference, Clemson House, Clemson, SC)

AMERICAN TEXTILE MACHINERY ASSOCIATION
May 23-27, 1960 (American Textile Machinery Exhibition, Auditorium, Atlantic City, NJ)

FEDERATION OF BRITISH INDUSTRIES
June 10-26 (British Exhibition of Industry, Technology, Science and Culture —Coliseum, New York, NY)

INTER-SOCIAL COLOR COUNCIL
April 11-12, 1960 (29th Annual Meeting—Philadelphia Museum College of Art, Philadelphia, Pa)

NATIONAL COTTON COUNCIL
Feb 8-9 (Annual Convention, Dallas, Texas); Sept 28-29 (9th Chemical Finishing Conference, Statler Hotel, Washington, DC)

PHI PSI FRATERNITY
April 28-30 (57th Annual Convention, Hotel Roosevelt, New York, NY)

SOUTHERN TEXTILE EXPOSITION
Oct 3-7, 1960 (Greenville, SC)

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION OF THE UNITED STATES
Nov 4 (Luncheon meetings at the Hotel Roosevelt, New York, NY); Dec 2 (Annual meeting and dinner—Hotel Roosevelt, New York, NY)

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, DELAWARE VALLEY SECTION
Mar 26 (3rd Philadelphia Conference of the Graphic Arts Industry—Benjamin Franklin Hotel, Philadelphia, Pa)

TEXTILE RESEARCH INSTITUTE
March 24-25, 1960 (30th Annual Meeting, Hotel Commodore, New York, NY)

AATCC Deceased

FRANK KORMAN
York, Pa

VIVIAN C McCOLLOM
President
Allentown Converting Co
Paterson, NJ

JOSEPH A WARING
Superintendent, dyeing & finishing
Van Raalte Co, Inc
Paterson, NJ

ERNEST H de VANDREUIL
Superintendent of dyeing
National Worsted Mills
Jamestown, NY

TO Manufacturers of Dyestuffs, Textile Chemicals, Wet Processing Machinery, Laboratory Equipment, and Incidentals for the Wet Processing Plant:

The Twenty-fourth
ANNUAL PROCESSING REVIEW NUMBER

will appear on December 14th, 1959. You are cordially invited to submit information concerning your new products that have been placed on the market since November, 1958.

How to submit information:

Please list your products alphabetically, compiling each catagory (ie, chemicals, dyestuffs, etc) separately. Information should include the trade name of the product and a BRIEF summary of its uses and properties. The information should be typed, double-spaced, on 8½ x 11 sheets of paper. If illustrations are necessary, glossy photos or black ink drawings should be furnished. If the trade name is registered or the product is patented, please so note.

In order to insure your new products being listed in our issue of December 14th, information concerning them should be in our office no later than November 16th.

It is important that you list ONLY THOSE PRODUCTS WHICH HAVE BEEN BROUGHT OUT SINCE NOVEMBER, 1958.

AMERICAN DYESTUFF REPORTER
44 East 23rd St, New York 10, N Y

INDIVIDUAL MEMBERSHIP DRIVE UNDERWAY

Leonard Smith (right), 1959 Convention chairman, wields scissors in ribbon-cutting ceremonies marking kickoff of AATCC's individual membership drive. Assisting are George P Paine, executive secretary, and girls representing the four regions of the Association.

Blaine O Bray, Columbia Southern Chemical Corp, signs up for membership at Washington as Raymond R Currier (left), also of Columbia Southern, and Herbert A Stauderman, chairman, Committee on Individual Membership, look on.

Delaware Valley Section Meeting

September 25, 1959 • Abraham Lincoln Hotel, Reading, Pa

(See report on page 51 of October 5 issue)

H T Pratt, E I duPont de Nemours & Co, Inc, discussed Orlon Cantrece, DuPont's newest sweater fiber, at September 25th meeting of Delaware Valley Section.

Models wearing garments manufactured from DuPont's new Orlon Cantrece fiber.

Villanova University Glee Club entertained at the September 25th meeting of the Delaware Valley Section at Reading, Pa.

ACTIVITIES OF THE LOCAL SECTIONS

Piedmont

PIEDMONT Section held its annual fall business and technical meeting Sept 25-26 at the Hotel Barringer, Charlotte, NC, with 426 in attendance at one or more of the various functions.

The subcommittees of the General Research Committee met at 9 am, following which the entire Committee met to hear Basil D Browder, executive vice president, Dan River Mills, Inc, discuss "Mill Management and Piedmont Research". Attendance at this function was 114.

The afternoon technical session, which followed an officer's luncheon at noon, attracted 225. J H Hennessey Jr, formerly with Polymer Industries, Inc, and now with Printed Fabrics Corp of Carrollton, Ga, spoke on "The Flash Ager in Action". Dorel Marian, Francolor, Inc, spoke on "New Developments in the Dyeing of Polyester Fibers and Other Synthetic Fibers in Europe".

The traditional Social Hour preceded the banquet, which attracted 183.

Speaker at the banquet was Malcolm E Campbell, dean, North Carolina State College School of Textiles, who was introduced by E A Murray.

The Section's Annual Business Meeting was held during the banquet, at which time the new officers for the coming year were presented as follows: *Chairman*—Linton C Reynolds; *Vice chairman*—V B Wright Jr; *Secretary*—R E Rettew; *Treasurer*—R L Ward; *Sectional Committeemen*—Thomas McIlwain, John Kilheffer, Phillip Lavoie, and Gordan Eaves; *Councilors*—Charles Zimmerman, J C King, W E Rixon, E A Murray, Neal Truslow, and Raphael Rupp.

$25.00 was placed in the Charles H Stone Scholarship Fund in memorium from Paul Haddock, past chairman of the Section.

Robert West, recipient of the Charles H Stone Scholarship Fund at N C State College, and Ralph Sims, recipient of the same fund at Clemson College, were presented to the membership.

Fred Fortess presented certificates of service from the National Headquarters to R H Souther for his work on Stream Sanitation Committee, Lawrence Heffner for his work in the evaluation of fire-resistant textile finishes, and Paul Stam for his work with the Executive Committee on Research.

W E Rixon, immediate past chairman, presented a service plaque to retiring chairman J C King.

Chairman King ackowledged the work of E E House for his fine service and work on the meeting.

PIEDMONT SECTION OFFICERS FOR 1960—Seated, l to r: Richard E Rettew, secretary; Linton C Reynolds, chairman; Joseph C King, Councilor, outgoing chairman. Standing l to r: Fred Fortess, chairman, Piedmont Section Research Committee; E A Murray, W E Rixon, Neal A Truslow, Councilors. Not present when photo was taken: V B Wright Jr, vice chairman; R L Ward, treasurer; Charles Zimmerman, Councilor

Retiring Chairman Joseph C King (left) receives Section's service recognition plaque from W E Rixon, immediate past chairman

Malcolm Campbell, banquet speaker at Piedmont Section's Fall Meeting

Western New England

WESTERN NEW ENGLAND SECTION met September 25th at Blake's Restaurant, Springfield, Mass with approximately 60 members and guests in attendance.

During the afternoon, a tour was made through the research laboratories and vinyl calendaring plant of the Monsanto Chemical Co at Indian Orchard, Mass.

Ralph Nickerson, Shawinigan Resin Co, Springfield, Mass, was the guest speaker of the evening. His paper was entitled, "Textile Applications of Polyvinyl Alcohol and Polyvinyl Acetate".

Mr & Mrs Norman S Cassel examine shirt made of 65% Dacron/35% cotton printed with pigments, after an extended wear test

PANEL—METROPOLITAN SECTION MEETING OF OCTOBER 16—Front row, l to r: Irving Mintz, Eureka Printing Co; Norman S Cassel, Interchemical Corp. Back row, l to r: Max Silverman, Sherwin Willims Co; C C Kerns, Waldrich Co; A Siepert, Interchemical Corp

Metropolitan

METROPOLITAN Section's second meeting of the season was held October 16th at Kohler's Swiss Chalet, Rochelle Park, NJ, with Chairman John A Kominos presiding.

Norman S Cassel, vice president, Interchemical Corp, in a paper entitled, "New Horizons for Pigment Printing", cited the bold thinking of this Space Age which resulted in a better understanding of basic molecular relationships of the materials with which textile printers work. Mr Cassel said that pigment printing, as in all technology, deals with complex forces of matter. "One must understand the fibers which make up the fabrics being printed, the mechanics of the printing process, and the relationships of these to the colors applied," he stated.

All surfaces have free surface energy in different degrees depending upon the chemical nature of the surface, and Mr Cassel explained the relationship of this free surface energy to many known aspects of pigment printing, such as condition of the emulsion, stability of the printcuts, adhesion to fibers, and tarnishing. Using this basic knowledge of molecular relationships and free surface energy, Mr Cassel discussed pigment printing of fabrics for optimum production by the printer as well as optimum performance for the consumer.

A Siepert, technical field service, Interchemical Corp; C C Kerns, assistant print superintendent and print chemist, Waldrich Co; Irving Mintz, superintendent, Eureka Printing Co; and Max Silverman, superintendent, of manufacturing, Sherwin Williams Co assisted Mr Cassel as a panel answering questions presented from the audience of about 200.

In the business part of the meeting, Nominating Committee Chairman Patrick J Kennedy proposed the following slate of officers: *Chairman*—John A Kominos, Waldrich Co; *Vice chairman*—P J Fynn, J C Penney Co; *Secretary*—Richard P Monsaert Jr, American Felt Co; *Treasurer*—Eugene J Grady, Jacques Wolf & Co; *Councilors* (two-year term)—Albert E Johnson, National Institute of Drycleaning; William A Holst, National Aniline Div; Richard E Miller, Eastman Chemical Products Co; *Councilor* (one-year term)—Edwin I Stearns, American Cyanamid Co; Sectional Committeemen (four to be elected)—P J Wood, Royce Chemical Co; Harry Moore, Fair Lawn Finishing Co; Emil C Hansen, Antara Chemicals; Max W Winkler, American Cyanamid Co; Donald E Marnon, Otto B May Inc.

Nominations by petition received to date are those for Adolph Dabal, Tanatex Chemical Co, for Councilor and Richard E Kimble, Kimtex Service Laboratories, for treasurer.

—●—●—

Hudson-Mohawk

V LINDSAY CHASE, Textile Colors Div, Interchemical Corp, Hawthorne, NJ, served as guest speaker at the October 2nd meeting of the Hudson-Mohawk Section held at Jack's Restaurant, Albany, NY.

The subject of Mr Chase's talk was "Color Science in Textile Coloring". In conjunction with his presentation, Mr Chase showed two films recently released by Interchemical Corp—"Color Magic" and "This is Color".

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Northern New England

WITH an impressive array of speakers from half way around the world and from across the continent, the Northern New England Section met at the Lexington Inn, Lexington, Mass, on October 16 to hear reports on the latest developments in research on the permanent setting of wool.

Harold P Lundgren, chief of the Mohair Laboratory for the Department of Agriculture's Western Research Laboratory, Albany, Calif, presented a paper on the subject of "Modified Epoxy Resin Formulations as Improved Finishes for All-Wool Fabrics". Dr Lundgren predicted that new and less costly resins with improved application techniques are a commercial possibility within the foreseeable future. These will satisfy the needs for shrinkproof fabrics of wool, he stated.

The work being done by the Commonwealth Scientific and Industrial Research Organization, Belmont, Australia, was discussed by this or-

ganization's principal research officer, Arthur J Farnworth, in his paper "The Permanent Setting of Wool".

Charles Macaluso of the Wool Bureau, Inc, New York, chose "The Application of Wool Setting Technique in the Garment Industry" as his subject. The talk was presented with a film showing the application of setting solutions and subsequent setting techniques for wool garments and fabrics by the clothing manufacturing industry in the United States. These methods are a direct extension of the durable creasing and pleating process developed by the Commonwealth Scientific and Industrial Research Organization as described by Dr Farnworth.

L to r: Robert D Robinson, NNE Section chairman; Harold P Lundgren, Western Regional Research Laboratory, USDA; Arthur J Farnworth, Commonwealth Scientific and Industrial Research Organization; Charles Macaluso, The Wool Bureau, Inc; Edward J McNamara Jr, NNE Section program chairman

Southeastern

THE September 12th meeting of the Southeastern Section at Ida Cason Callaway Gardens, Pine Mountain, Ga, was attended by 195 members and guests. The meeting featured a "round-table" discussion on vat dyeing, a symposium on nonwoven fabrics, and presentation of the Section's Scholarship to Shepard Albert Odom Jr. A certificate of service was presented to Paul V Seydel at the technical session.

The "round-table" discussion on vat dyeing was moderated by Leon Tigler of Reeves Brothers' Eagle & Phenix Division, Columbus, Ga, with approximately 60 members attending.

Arrangements for the meeting were made by Frederick F Hand, sales engineer, Callon Plant, Callaway Mills Co, LaGrange, Ga, who served as master of ceremonies at the symposium on nonwoven fabrics. The symposium included talks by D C Nicely, group leader, Nonwoven Fabrics Group, Chemstrand Corp, Decatur, Ala, whose subject was "Properties of Acrilan Nonwoven Fabrics as a Function of Fiber and Binder Content"; Paul A Homier, superintendent, Callon Plant, Callaway Mills Co, La Grange, Ga, whose talk was "Areas for Nonwoven Fabrics Advancement"; and E L Clements, sales engineer, Nonwoven Fabrics, Celanese Corp, Charlotte NC, whose talk was "Styling and Decorating Acetate Nonwovens".

The ladies' program, handled by Mrs Kenneth E Miller, included a bridge and canasta party. Prizes for the ladies were donated by Callaway Mills, Jefferson Mills, and Muscogee Manufacturing Co.

SOUTHEASTERN SECTION SYMPOSIUM ON NONWOVEN FABRICS—L to r: Robert B Hallowell, Coats and Clark, Inc, chairman, Southeastern Section; E L Clements, Celanese Corp of America, Paul A Homier, Callaway Mills Co, and D C Nicely, Chemstrand Corp, speakers; Frederick F Hand, Callaway Mills Co, symposium chairman

Certificate for service as chairman of AATCC Committee on Evaluation of Desizing Agents was presented to Paul V Seydel, Seydel-Woolley & Co (standing, left) by A Kempton Haynes, Rohm & Haas Co, Southeastern Section custodian

Leon Tigler, Reeves Bros, treasurer of the Southeastern Section, is shown leading a "round table" discussion on vat dyeing, which was attended by approximately 60 members

Rhode Island

SENATOR John O Pastore (D-RI), at the September 25th meeting of the Rhode Island Section held at the Wannamoisett Country Club, outlined in general the scope of the recently dissolved subcommittee which investigated the import and export phases of the textile industry and how it affects the domestic textile business.

Senator Pastore reported that a new Congressional interagency textile committee has been formed of members from government and industry. Their function is to keep abreast of domestic and foreign textile activities and to maintain continuing data service for federal, state and municipal inquiries, as well as to inquiries from the textile industry itself.

The Interagency Textile Committee was set up at the request of the Senate subcommittee, which was under the chairmanship of Senator Pastore. Funds for "ITC" operation were received through President Eisenhower in August, so it will be several more months before information will be available. The "ITC" will operate under the offices of the Department of Commerce.

Speaking to more than 200 members of the Section, he suggested the answer to the textile import problem is not necessarily to raise tariffs. Instead, he stated, the State Department might reappraise its position with regard to textile quotas and "get away from the use of the word quota as an obnoxious one".

Senator Pastore further offered that, although the actual amount of cheap textile imports to this country is rather small (3%), the psychological effect tends to restrain buyer activity. He stated that the textile industry is guilty for "overproducing" and that some textile leaders cling to the notion that a profitable operation can only be accomplished by "running around the clock, (on a) 24-hour basis". He went further to say that the rest of the United States economy has "achieved astronomical growth while the textile industry has remained almost stagnant" during the last ten years.

Following his short address, the former Rhode Island Governor conducted a lengthy question-and-answer period. In a final reply he stated, "Quotas on imports are a matter of Presidential directive. I won't say the (new Interagency Textile) Committee will have an effect on quotas, but it should supply a better understanding of the problems of textiles to the administration."

At the same meeting, William H Cady was presented a silver medal and honorary membership scroll from the Society of Dyers and Colourists for fifty years of service to the British society. The Award, SDC's highest honor, was presented to Mr Cady by W George Parks, AATCC vice president, New England Region.

Mr Cady for many years served as editor of the AATCC *Technical Manual*, and also served as the American editor for the new *Colour Index*, 2nd edition. Mr Cady, a past president and an Honorary Member of AATCC, remains active on several committees of the Association while continuing his activity with the Rhode Island Section.

The Rhode Island Section held its October 23rd meeting at the headquarters of the Providence Engineering Society with approximately 80 members and guests in attendance.

Edmund Waters, head of the New Fiber Dyeing Section, Imperial Chemical Industries' Dyestuffs Div, Manchester, England, spoke on "Reactive Dispersed Dyestuffs for Nylon". Following Mr Waters' paper, a film by Dow Corning Co, "You and the Silicones", was shown.

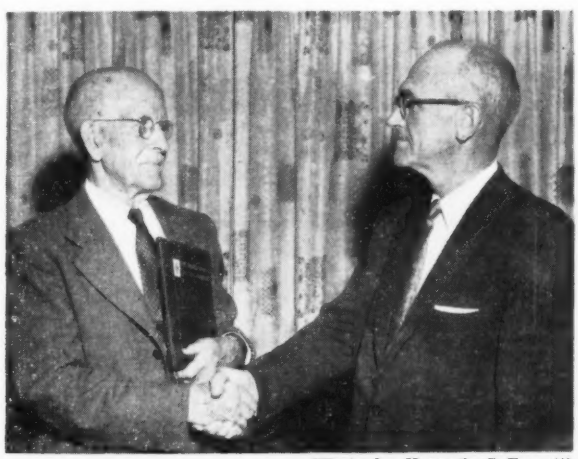
The Section's next meeting will be held Dec 4 at Johnson's Hummocks Grill, Providence, RI.

(Photo by John E Trezise)

HEAD TABLE AT RI SECTION MEETING OF SEPTEMBER 25—L to r: William H Cady; W George Parks, AATCC vice president, New England Region; Sen John O Pastore (D-RI), guest speaker; Robert H Phillips, Section chairman; Thorwald Larson, past chairman; Harold B Sturtevant, Section treasurer.

(Photo by Kenneth C Everett)

Senator John O Pastore (left), D-RI, is greeted by R I Section Chairman Robert H Phillips.



(Photo by Kenneth C Everett)

William H Cady (left) receives Honorary Membership in the SDC from W George Parks representing the Society

ORGANIZATION OF THE AATCC

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LOUIS A OLNEY
(deceased)

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STUDENT CHAPTERS

Alabama Polytechnic Institute, Bradford Durfee College of Technology, Clemson College, Georgia Institute of Technology, Lowell Technological Institute, New Bedford Institute of Technology, North Carolina State College, Philadelphia Textile Institute, Rhode Island School of Design

IMPORTANT NOTICE

To all manufacturers of Textile Chemical Specialties:

The American Association of Textile Chemists and Colorists is now collecting material for the 1960 Edition of the Technical Manual and solicits your cooperation.

The list of Textile Chemical Specialties will be completely revised. The object is to eliminate all obsolete products and firm names.

PLEASE NOTE: ONLY THE PRODUCTS OF FIRMS THAT SUPPLY THE INFORMATION REQUESTED IN THIS NOTICE WILL BE LISTED IN THE 1960 EDITION OF THE TECHNICAL MANUAL

All manufacturers and importers of textile chemical specialty products, therefore, are notified that information is requested on all current products including those that have been listed previously.

The desired information should be supplied strictly in accordance with the following directions; otherwise it may not be feasible to use it. To meet editorial schedules, all data must be received by the undersigned before December 15, 1959.

WILLIAM D APPEL, Editor, Technical Manual
9101 Jones Mill Road, Chevy Chase 15, Maryland

DIRECTIONS FOR SUPPLYING INFORMATION

Use ordinary white rules 3"x5" index cards (obtainable from any stationery store). Type the information on the cards following the instructions given further on in this notice where the information desired is explained and where examples of cards properly filled out are shown. You will note that the instructions differ from those in previous years and that they are designed to make your task easy.

It is necessary that you follow the instructions carefully; cards not correctly filled out will be returned to you for improvement. In particular, please use capital letters only where they are required; for example, at the beginning of sentences, in the key to the firm name, and at the beginning of trade names. Please see that the "Chemical Nature" of each product is properly recorded. We do not ask you to reveal secret information, but such vague descriptions as "amine compound" and "organic salt" are not considered adequate. Please check your cards carefully to avoid errors in the printed list.

In compiling the list, products are entered primarily for their specific usefulness in textile processing, with the idea of presenting information for the benefit of textile chemists. However, because some textile chemicals, such as surface-active agents, are employed in other industries, nontextile uses may also be indicated.

Please bear in mind that the information received from you regarding the uses and chemical nature of your products will be reported without investigation and thus cannot be vouched for by the AATCC. On the other hand, because products are listed without charge for the benefit of our membership, we reserve the right to edit all data received and especially to revise the list of "various uses" where necessary to conserve space.

I. KEY

ABCDE

ABCDE Chemical Company

24 South Main Street

Deep River, Conn.

(a) On first line: key to firm's name. See 1959 Technical Manual pages 387-393. Take care to use capital letters correctly. Key is limited to not over 5 letters.
(b) On third line: name of firm
(c) On fourth and fifth lines: address of firm.

NOTE: ONLY ONE KEY CARD IS NECESSARY FROM EACH MANUFACTURER

II. INDEX ENTRY

Bleaching Agents

Ableachor ABCDE

(a) On first line: one of the headings from the index in the 1959 Edition, pages 393-428, indicating an important use for the product being reported. If it has several uses, make a separate card for each.
(b) On third line, toward left: list the name of the product (only one) without any descriptive letters or numbers.
(c) On third line, near right margin: give the key to the name of your firm (see above).

III. ALPHABETICAL LIST ENTRY

ABCDE

Ableachor* CWS

Bleaching of all fibers

H_2O_2

(a) On first line: key to firm's name
(b) On third line: complete proprietary name of product, with descriptive letters or numbers; if name of product is a registered trade-mark, indicate the fact by an asterisk following the registered part of the name.
(c) On fifth line: write "correctly listed in the 1959 Manual" if the information on uses and chemical nature given there is correct; otherwise give
(d) On fifth line: various uses, limited to 20 words.
(e) On eighth line: chemical nature, adequately given.
(f) On tenth line: patent number, if product is patented.

Abstracts

The Finishing of Fabrics Containing Wool Blended with Terylene or Acrylic Fibers

Whewell, C S, *J Soc Dyers Col 75*, 378-83, July, 1959

An account is given of modern practice in the finishing of fabrics containing wool blended with polyester or acrylic fibers, together with the new data relating to the changes in dimensions of wool/Terylene blended fabrics during finishing, and to certain physical properties of the finished cloths. The author states, however, that the finishing of fabrics containing both wool and acrylic or polyester fibers is "very much in its infancy." In most instances the aim has been to obtain a fabric which is as much like wool as is possible, he says.

Man-made fibers, particularly the acrylics, can be heat-set, and are therefore suitable for making "high-bulk" yarns by blending set and unset fibers in the yarn, and then relaxing the yarn under appropriate conditions. The development of high-bulk yarns is an important one which has not yet been fully exploited. Terylene is also strong and suitable for making high-bulk yarns by the false-twist, stuffer-box, and other recently developed techniques. These yarns have new and interesting properties, and will find important uses in fabrics containing wool.

Many worsted fabrics are greatly improved by being set, but most traditional woolen cloths are not set. The processes available are dry blowing, crabbing, wet blowing or steaming, and high-pressure steaming. If blended cloth contains less than 10 percent of man-made fiber, no change in the wool routine is necessary.

Wool/acrylic blended fabrics are easily scoured, but wool/Terylene blended cloths are more difficult to scour than all-wool, and require a more severe treatment. Alternatively, an oil-soluble polar compound (eg, Lissapol NX) may be added to the combing oil. In general, the greater the proportion of Terylene or acrylic fiber in the blend, the smaller is the shrinkage, which takes place during scouring.

Although presetting the fabrics helps to reduce crease formation during scouring, it is desirable to keep the temperature of scouring and washing-off as low as possible, compatible with obtaining a clean piece. Creases inserted at high temperatures tend to become permanent. Fabrics should also be cooled gradually.

In milling both wool/Terylene and wool/acrylic blended fabrics, the greater the percentage of man-made fiber in the fabric, the less is the shrinkage under almost all conditions of milling.

To reduce the tendency of a cloth to "pill", good cropping is recommended. Pills are formed by mechanical action on the fibrous fuzz on the surface of the cloth. With all-wool cloths the pills are subsequently easily detached, but with fabrics containing the stronger fibers the pills are detached only with difficulty. The author adds, however, that singeing is the most effective means of reducing pilling.

Seven references to the literature are cited.

•

Dyeing Unions Containing Acrylic Fibers

Kramrisch, B, *J Soc Dyers Col 75*, 364-71, July, 1959

The acrylic fibers discussed in this paper are Orlon 42 (Du Pont), Courtelle (Courtaulds), Acrilan 16 (Chemstrand), all three containing at least 85% acrylonitrile, and regular Acrilan, a basified acrylic copolymer.

Unions of Acrylic and Cellulosic Fibers. Direct, developed, vat and reactive dyes show little or no staining of acrylic fibers, as a rule. Sulfur and solubilized vat dyes tend to stain these fibers.

Disperse dyes are used for light shades on acrylic fibers. They usually build up better on Acrilan than on the straight acrylics. They generally show some staining on cellulosics also, which often can be removed by scouring but may need a permanganate bleach.

Basic dyes are used for dyeing all types of acrylics, but may stain the cellulosics also. A hydrosulfite treatment for clearing the latter is recommended.

Selected acid and chrome dyes may be applied to Orlon 42 by the cuprous ion treatment, but these dyes have limited application, according to the author. The 1:2 metal-complex dyes, however, applied at 125°C, give dyeings of good fastness to light and washing on the acrylics, though some staining of the cellulosics may occur. Acrilan can also be dyed with most acid and chrome dyes.

Solid colors and two-color effects may be produced by either one-bath or two-bath methods on unions containing all types of acrylic fibers, using combinations of direct and disperse dyes. The two-bath method may be needed for clean-cut two-color contrasts.

Unions of Acrylic Fibers and Wool. Wool/Acrilan unions may be dyed in light shades with combinations of disperse and neutral-dyeing wool dyes. When acid dyes alone are used by conventional methods, preferential dyeing of the wool usually occurs. Some of the 1:1 metal-complex dyes give good solidity, but the 1:2 metal-complexes dye the wool heavier.

Reactive dyes, when applied to wool/Acrilan by wool-dyeing technique, either reserve the Acrilan or show little staining.

Wool unions containing the other acrylic fibers are usually dyed by two-bath methods. The acrylic fiber may be dyed first with disperse dyes and the wool cross-dyed later with neutral-dyeing wool dyes, or the acrylic fiber may be dyed first with modified basic dyes.

The dyeing of unions of Acrilan/silk, Acrilan/nylon, and cellulose triacetate combined with the acrylics is also discussed.

Full details are given for all the above applications, and a long question-and-answer discussion follows.

Nine references to the literature are cited.

•

Reactive Dyes

Anon, *Dyer 122*, 55-6, August 14, 1959

The number of reactive dyes available is gradually increasing, and it is apparent that they are going to play an important part in the coloring of textiles. In the early days they were considered to have only limited application, but this was primarily due to the fact that only a few colors were available and the best methods of processing were still to be developed. Now ranges of reactive dyes are manufactured in Britain, Germany and Switzerland, and a wide selection of shades can be obtained.

Reactive dyes were used by printers at an early stage, and have since been adopted by dyers, and are now applied to skeins, cakes, beams and raw cotton, as well as to piece goods.

One of the most popular methods of application to piece goods is by the heat curing or Thermofix process.

The dye is applied by padding from a bath containing urea and soda ash at a temperature of the order of 60°C, followed by drying in a hot flue or on cans, providing the first stack is wrapped. Fixation is obtained by curing at 140-170°C for one and one-half to five minutes. The fabric is subsequently given a hot rinse and a soaping treatment, usually on a continuous soaping range.

Probably the method employed most commonly is the continuous pad-steam method. The fabric is padded through the dye and dried, taking care to avoid migration. It is then padded through a cold bath containing common salt and caustic soda, followed by steaming at 105-108°C for one-half to one and one-half minutes. Wash-off is carried out in the remaining boxes of the range.

Perhaps the least satisfactory dyeing method is that carried out on the jig. In the case of some reactive dyes it is necessary to use an enclosed jig in order to obtain the required fixation temperature.

The main problem with reactive dyes is that of removal of inactivated or hydrolyzed dye which remains mechanically held by the fiber or fabric and has neither adequate fastness nor the required appearance.

Some blends, eg, cellulosic fibers and Terylene, can be dyed in piece form with reactive dyes, providing the dispersed acetate dye component will withstand the alkali concentration necessary for fixation of the reactive dye. The Thermofix method is usually employed.

It is also possible to apply reactive dyes to nylon from a dilute acetic acid bath, raising the temperature and making further addition of acid. A final addition of ammonia is made to a cooling bath.

•

Developments with Lifeguard Flame-retardant Solution

Whowell, F, *Dyer* 122, 136-8, August 28, 1959

Work on flame-resistant textiles has been undertaken by many individuals and organizations over the last 50 years, but it is only in recent years that processes have been developed which give permanent and acceptable results.

Lifeguard (produced by Peter Spence & Sons Ltd), which was first developed in the U S, contains titanyl chloride and antimony trichloride. In use, the Lifeguard solution is padded on to the fabric to be treated, and the oxides of titanium and antimony are deposited by neutralization with soda ash. These mixed oxides confer flame-retardant properties to the treated textiles.

Assuming that the cloth is suitably wettable, the problem of impregnation with Lifeguard is that the required percentage of mixed oxides must be placed at the desired point *within* the fabric. The problem can be considered analogous to that of khaki dyeing, where again a definite percentage of metal oxides have to be applied evenly within the structure of the fabric. For a permanent effect, approximately 12-14 percent of mixed oxides must be deposited in the fabric.

No direct correlation exists between the oxide content and the effectiveness of flame retardance. The situation of the oxides in the fabric is most important, as a high proportion of oxides on the surface could lead to excessive dustiness of the treated fabric and a rapid drop in flame retardance, as such surface oxides are easily removed in laundering. There is invariably a surface layer of precipitated loose oxides which must be removed by subsequent washing.

After impregnation, under ideal conditions, ten minutes must elapse before proceeding to neutralization. Beyond 30 minutes, reduction in tear strength will result. Thorough washing in cold water after neutralization is essential.

A test procedure for flame resistance is given, taken from British Standard Specification 2963:1958. The author states that treated flannelette is now available which complies with this specification for low flammability, is nontoxic and free from dermatological troubles, and retains its soft hand.

Four references to the literature are cited.

OBITUARY

J H HENNESSEY

JOHN H HENNESSEY, vice president of Berkshire Color & Chemical Co, Delawanna, NJ, died as a result of a fall at his home in Glen Rock, NJ, October 24.

Mr Hennessey had been active in the dyestuff industry since his graduation from Philadelphia Textile Institute in 1922. In 1923, he joined the Philadelphia office of Kuttroff, Pickhardt & Co. In 1926, he was transferred to the Charlotte NC office of General Dyestuff Co and two years later to the New York office, where he became head of the vat-dyes department. It was there that he, along with Donald E Marnon, invented the Marhen Process. He resigned from GDC several years ago to become vice president of Berkshire Color & Chemical.

Mr Hennessey had long been active in AATCC affairs, both at the national and sectional levels. He served on several research committees represented the erstwhile New York Section as a national councilor, and also served the Section as chairman and treasurer.

Mr Hennessey served the Government in both World Wars. Prior to his entry into Philadelphia Textile Institute, he served in the field artillery in WWI. During WWII, he served as chief of the Cotton Finishing Section, War Production Board, as a dollar-a-year man in Washington for 15 months.

F C HOLDEN

FRANK C HOLDEN, a charter member of AATCC, was stricken with heart failure August 6, 1959 at his home in Largo, Florida.

Mr Holden was born in Lawrence, Mass, May 19, 1887, educated at Lawrence High School and Lowell Technological Institute, graduating in 1909. He spent many years with the old Chelsea Fiber Mills in Long Island City, and with Ludlow Mfg Co at both Ludlow and Needham, Mass. He retired in 1957.

R C MONSAERT

RICHARD P MONSAERT, 66, retired president and manager of the former Puritan Piece Dye Works, Paterson NJ, died October 1, following a brief illness.

Born in Belgium, Mr Monsaert came to this country when he was six. In 1922, he joined his brother in founding the Silk Throwing Co in Paterson and 1935 he founded Puritan, still keeping his interest in the former company. He remained as president of Puritan until 1958, when the firm terminated its business.

E W SPRINGS

COLONEL ELLIOTT WHITE SPRINGS, one of the industry's most fabulous figures, died October 15 in New York of cancer of the pancreas. He was president of Springs Cotton Mills, and Springs Mills, Inc.

News of the Trade

Woolen and Worsteds of America Inc Holds 1st Convention

Woolens and Worsteds of America Inc held its first annual convention on October 15, 1959 at the Waldorf-Astoria, New York, NY.

The program included a general membership meeting in the morning, a reception and luncheon at noon, and round-table sessions in the afternoon.

Speakers at the Luncheon included G Norman Winder, president of the new organization; Harold P Lundgren, Wool and Mohair Laboratory, USDA; and the Hon Richard M Simpson, ranking U S Congressman, House Ways and Means Committee.

At the "round-table" sessions, WWA staff executives were available for discussions on general activities and cooperative efforts.

Mr Winder was reelected president and William I Kent, Kent Mfg Co, reelected first vice president of the inter-industry group, which now numbers almost 100 firms and associations as members.

Other officers elected by the year-old organization include as vice presidents: Ronald A Mitchell, Cyril Johnson Woolen Co, Inc, and George A Ott, Richard Ott & Sons, chairman of Wool Promotion Fund of the Wool Trade.

J M Jones, secretary of the American Sheep Producers Council, was reelected treasurer, and Robert S Taplinger, Robert S Taplinger Associates, Inc, was reelected secretary.

The organization, which came into being for the primary purpose of building prestige and sales of American woolens and worsteds products, also increased its board of directors membership from six to fifteen.

Elected as directors for the coming year were: G Norman Winder, Ronald Mitchell, George Ott, Walter Pfluger, William Kent, Stewart MacArthur, Edwin Wilkinson, William Sullivan, J H Stursberg, George Asnip, Douglas Hewat, William Bridges, Robert Stopford, Jackson Spears, and Ronald Boyd.

•

Textile Fiber Symposium at ACS Regional Meeting

A new method of improving cotton fabrics is among the subjects to be discussed at the American Chemical Society's 1959 Southeastern Regional Meeting, which opens at the Hotel John Marshall, Richmond, Va, on Thursday, November 5.

A symposium on textile fibers will feature such subjects as fundamental requirements of shrink-resistant fabrics and a new process for the cyanoethylation of cotton fabrics. Jack Compton, Institute of Textile Technology, Charlottesville, Va, is chairman.

•

FMC Expands Phosphorus Output

The Mineral Products Division of Food Machinery and Chemical Corp, one of the largest producers of phosphorous-based chemicals, has announced a major expansion in production of its Pocatello, Idaho phosphorus plant.

R F Moran, manager of FMC's Mineral Products Division, noted that consumption of phosphorous-based chemicals for detergent and industrial use has been increasing and that FMC is expanding its production in recognition of these growing demands. The Pocatello phosphorus plant, said to be largest west of the Mississippi, has been in production since 1948, and has been expanded several times previously to insure continuity of supplies.

Elemental phosphorus from Pocatello is shipped to FMC's plants in Lawrence, Kan; Newark, Calif; and Carteret, NJ, where it is used to produce a broad line of sodium and potassium phosphates, phosphoric acid, and other phosphorus-based chemicals.

•

First Phase of Pennsalt Chlor-Caustic Modernization Nears Completion

Pennsalt Chemicals Corp will complete the first phase of a $6,000,000 modernization program of its Wyandotte, Mich chlorine-caustic soda facilities before the end of this year. The first section of improvements, now nearing completion, reportedly includes new 50% caustic-soda evaporating facilities designed to reduce costs and improve quality.

The second major phase will be the replacement of several thousand Gibbs diaphragm-type electrolytic cells with a much smaller number of 30,000-amp, more economic cells, along with improvements to auxiliary cell-room equipment. When the new cells go on stream in mid-1960, the facility is expected by Pennsalt to produce chlorine and caustic soda with product quality and operating efficiency equal or superior to any existing diaphragm cell operation.

Pennsalt's Michigan plant, located downriver from Detroit, is one of the Company's largest single manufacturing units encompassing both inorganic and organic chemical operations. Products range from basic chlorine and caustic soda to derivative chemical compounds, such as sal ammoniac, sodium orthosilicate, calcium hypochlorite, ferric chloride, ammonia and hydrogen peroxide. This plant also manufactures such organic compounds as solvents, amines (organic intermediates), rubber chemicals, and raw materials for resins and plasticizers.

•

NCSC Textile School Freshman Enrollment Up 57%

The School of Textiles at North Carolina State College has reported a freshman enrollment increase of 57 percent and a total enrollment jump of 13 percent above last fall's figures.

In announcing the registration increase, Malcolm E Campbell, dean of the college's School of Textiles, said the textile student body includes representatives from 16 states and 21 countries.

Dean Campbell said the number of students transferring from other colleges and universities to the School of Textiles also has shown a marked rise.

The School's total enrollment now stands at 346 including 74 new freshmen. This compares with 307 students who registered last fall and 47 new frsehmen who enrolled last year. 249 of the 346 students in this year's enrollment are North Carolinians.

He attributed the enrollment increases to two factors—"a much improved financial situation in the textile industry" and "an intensive recruiting program" conducted by G H Dunlap, director of the Placement Bureau in the School of Textiles, and Prof W H Smith of the faculty.

A scholarship program including restricted and unrestricted funds totaling $28,400 reportedly has enabled the School of Textiles to attract some of the most talented graduates of the State's public schools.

Morningstar-Paisley Expands Textile Department

An expanded Textile Department to encompass all Morningstar-Paisley products sold to the textile industry has been announced by Earl C Lenz, vice president of sales, Morningstar-Paisley, Inc, New York, NY. Lee Kritzer, with headquarters in Charlotte, NC, has been appointed manager of the new department. His New York staff includes Mortimer E Stern, sales and service manager; Ira Schaffer, Technical service manager; and John Snoop, textile printing specialist. The technical staff is under the overall supervision of Don Kehoe, head of the firm's Hawthorne, NJ laboratory, and includes Saul Tessler, chief textile chemist, who will supervise textile product evaluation and application.

Morningstar-Paisley textile products cover a complete line of specialty starch products for sizing, printing, and finishing operations. One important group of these products is based on potato, tapioca, sago and corn derivatives, and includes raw starches, oxidized and etherified starches, as well as starch amides and dextrines. Blends of starch products with resins, plasticizers and chemical additives are also significant features of the line. Water-soluble gums, in both natural and processed form, and pregelatinized starches are another specialty of the new Department. These products include gum arabic, tragacanth, karaya, gum ghatti, locust bean, guar and okra. Chemically treated gums and starches trademarked Tab-A-Tex and Nafka Crystal Gum and Solvitose, as well as several liquid gum solutions, are now being used in textile printing operations.

The liquid textile product line has also been greatly expanded under the new departmental arrangement. Close liaison between the Textile Department and the Morningstar-Paisley Liquid Resin Department will be maintained through Edward Bearman, chief chemist of the firm's Clifton Liquid Product Laboratories. Liquid textile specialties include polyvinyl acetate emulsions in homopolymer, copolymer and terpolymer types. Natural and synthetic latex compounds for rug, carpet and upholstery backing operations and vegetable-based printing pastes, resin-based pigment and gold-color binders and vinyl chloride plastisols are also supplied to the Textile Department by the M-P Liquid Resin Department.

Sales and service offices will be established at New York, Charlotte, NC, and in a New England city to be decided later. Pilot-plant runs of several new starch derivatives for warp-sizing and finishing operations have been concluded at the Hawthorne, NJ, research laboratories with full-scale production expected in the near future.

•

New Service by Dow Corning

William H Ragborg has been appointed to manage a new Dow Corning Corp technical service and development laboratory to be built adjacent to the Company's other plants in Greensboro, NC.

This laboratory will be part of the Product Engineering Department under the direction of T A Kauppi in Midland, Mich. It will also do research and quality control work for Dow Corning emulsion and specialty products plants in Greensboro.

Also transferring to Greensboro are E M Eddington and R C Gergle. Eddington has, for several years, specialized in technical service for textile plants. Gergle, a member of the Product Engineering Fluids Laboratory, will concentrate on the development work of the laboratory. Raborg is now assistant manager of the Fluids Section of the Product Engineering Laboratories.

•

USTC Expanding Instrument Development Facilities

United States Testing Company, Inc, Hoboken NJ, has added to its staff of instrument design engineers, specialists in the fields of electronics, automation and miniturization. Joseph J Crowley, manager of the Textiles Division, stated the Testing Company's Scanor-Tron, a packaged electronic unit which classifies materials in terms of color, reflectance and particle count, is an example of what this team of engineers has produced. Mr Crowley says that this combination of electronics, design and textile engineers is unique in the industry and will lead to new and better instruments for the evaluation of textile products.

The U S Testing Company has developed and supplies to industry thirty-six different textile instruments, including a flammability tester, knit shrinkage gauge, atmospheric fume chamber, Terg-O-Tometer and others.

•

Monsanto Completes Everett Expansion

Monsanto Chemical Company's Inorganic Chemicals Division has announced completion of expansion of its Everett, Mass, facilities for the production of the company's ACL-85 and 70 products (chlorinated isocyanuric acids).

The expansion more than doubles the original capacity of the plant, which was placed on stream two years ago.

In addition, facilities for the full-scale commercial production of ACL-59 and ACL-60 (chlorinated cyanuric acid salts) have been constructed at the plant, Monsanto said. These products have been produced in pilot-scale quantities since their introduction 18 months ago.

Acceptance by the trade of ACL products for use in formulating dry bleaches, sanitizers and scouring powders has made the expansion necessary, the Company said.

•

Novamont Corp to Double Capacity of Polypropylene Plant

In a move designed to meet increasing demands for its Moplen polypropylene, Novamont Corp has announced plans to more than double production capacity of its Neal, W Va plant to 25 million pounds annually.

Plant designs have been revised to accommodate the new production figures, but this planned increase reportedly will not delay construction start-up scheduled to begin this month. The plant is slated to go on stream early in 1961.

Novamont's Neal plant will be situated on a 200-acre tract on the Big Sandy River. In addition to polypropylene, other polyolefins important in the manufacture of high-quality textile fibers and yarns, elastomers, and plastics will also be produced.

•

141 Frosh Enrolled at PTI

One hundred and four freshmen registered at the Philadelphia Textile Institute as the college opened its 76th fall semester.

Coupled with the two hundred and thirty-one returning upper classmen, total enrollment at PTI now stands at three hundred and thirty-five.

Of the freshman class, eighty-six are from the United States and eighteen are from nine foreign countries including: Pakistan, India, Uruguay, Israel, Turkey, Argentina, Egypt, Mexico and Venezuela.

The new class shows forty-two registrants for the Management and Marketing degree course, twenty-three for Textile Engineering, fourteen for Chemistry, and seven for Design.

•

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10,000 Chemists, Dyers and Finishers will read, and keep for reference purposes, this issue which will list all new dyestuffs and chemical auxiliaries produced since November 1958.

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New dyestuffs, new chemical auxiliaries, new machinery, important to wet-processing operations assure an intense readership among many that your sales force cannot interview personally.

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Lee

Clinton W Lee has been appointed New England District Manager for the Onyx Oil & Chemical Co, Jersey City, NJ.

Mr Lee will be in charge of Onyx's sales and service office at 6 Beacon Street in Boston, Mass, which serves textile and industrial customers in New England and the Eastern half of New York State.

For the past 10 years, Mr Lee has travelled the New England States as district manager for Shell Chemical Corp.

•

Recipient of the first Barnett D Gordon award at Lowell Technological Institute was *William C Hahn*, a member of LTI's class of 1963.

Mr Gordon, president of MKM Knitting Mills and member of the LTI board of trustees, established the prize of $250 this year, to be awarded annually to the entering freshman at Lowell Tech who scores highest in the mathematics section of the Scholastic Aptitude Test administered by the College Entrance Examination Board.

•

Hicks

Polymer Industries, Inc has appointed *Albert M Hicks* as technical representative for its Textile Division. Mr Hicks will service accounts in the northeastern sales territory, with headquarters in Polymer's Springdale, Conn, offices.

Mr Hicks was previously associated with Colgate-Palmolive Co as a representative for its organic chemical division.

•

Spence

Hennessey

Warwick Chemical Division of Sun Chemical Corporation has appointed *Thomas B Spence* Southern district sales manager and *Frederick B Hennessey* technical sales representative.

Mr Spence, who will make his headquarters in Warwick's Rock Hill, SC, office was formerly associated with Bryant Chemical Corp and with the Organic Chemicals Division of American Cyanamid Co in the Piedmont area.

Mr Hennessey will call on the trade in Metropolitan New York and Pennsylvania. He was formerly associated with Industrial Rayon Corp as sales service engineer specializing in dyeing and finishing problems and had previously been associated with Waldrich Co as assistant finisher and salesman.

•

Richter

Alan M Richter, director of public relations, Philadelphia Textile Institute, has been appointed general chairman of the PTI Foundation corporate fund-raising drive for the 1959-60 fiscal year by the Foundation Trustees.

The Trustees also selected as a goal $115,000 to be raised for the year. The funds are needed for the equipping and furnishing of the Institute's new $600,000 Student Union Building to be opened early in 1960.

Richter joined the Foundation in 1955 as public relations director and has been assisting in fund-raising work since then.

•

Rogers

Ervin Rogers Jr was appointed director of sales training for Wallerstein Co, Staten Island, NY, a division of Baxter Laboratories, Inc.

Prior to joining the Wallerstein staff, Mr Rogers was associated with the Armour Pharmaceutical Co, first as a salesman and later as district and then divisional manager.

•

Appointment of *Joseph A Okey* of Graham Chemical Co as a Southern representative of Eastern Color & Chemical Co, Providence, RI, has been announced.

From his home office at Graham, NC, Mr Okey will represent Eastern Color & Chemical Company in the Carolinas and Virginia.

•

G J Esselen has been named sales manager of the Industrial Chemicals Division of Pittsburgh Coke & Chemical Co.

Prior to his appointment, Mr Esselen was sales manager of the company's Activated Carbon Division.

•

Rauh

Edward Rauh has been appointed sales representative of Colton Chemical Company, Cleveland 14, Ohio, Division of Air Reduction Co, Inc. His assignment includes western Ohio, eastern Indiana and Michigan.

Before joining Colton, Mr Rauh was in the research department of Diamond Alkali Company and in the chemical research department of Lubrizol Corp.

•

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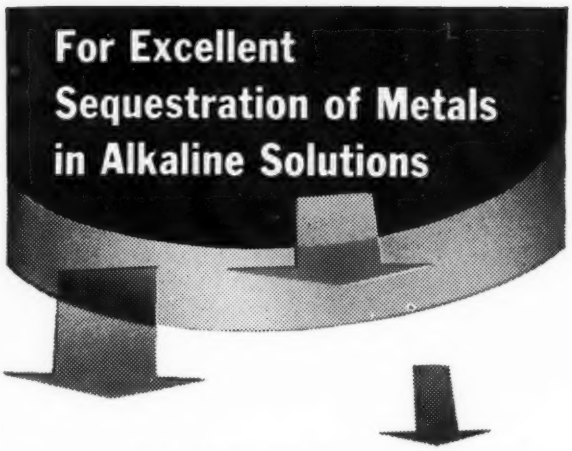

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Morene S is soluble in caustic soda solutions, including mercerizing strength caustic. It is stable to peroxide and chlorine bleaching agents. When added to piling liquor in loading kiers it prevents the formation of insoluble iron and aluminum salts. Morene S improves bleaching by preventing degradation of fibers caused by localized bleaching action of heavy metals.

Are These Your Problems?

Migration of Dyestuffs?

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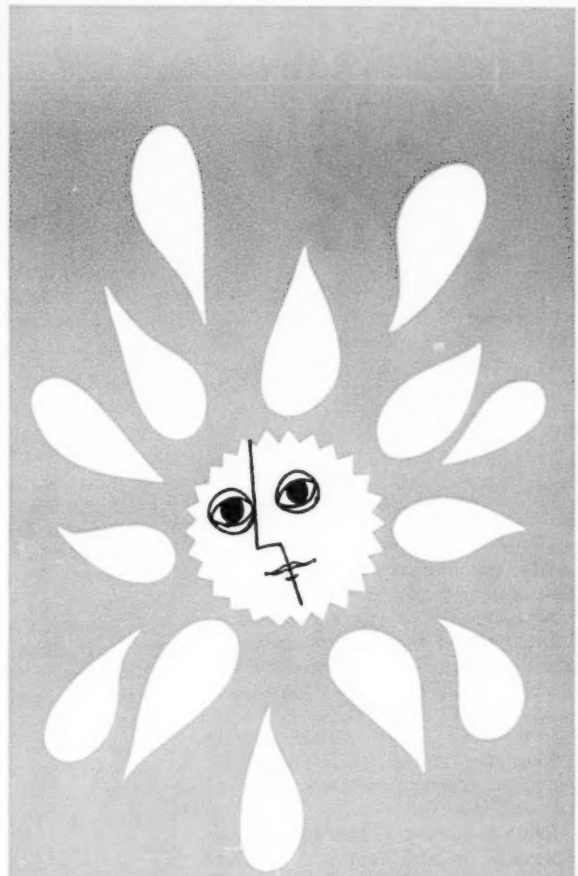

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Sandoz
THINKS AHEAD WITH TEXTILES
SANDOZ

Davis

Fred C Davis has been made superintendent of Long Finishing Mills, Inc, Burlington, NC.

Mr Davis, who assumed his duties with Long on August 15, was for twenty years superintendent of dyeing and finishing at Prim Hosiery Mills, Chester, Ill, and held a similar position for twelve years with Strutwear, Inc, Minneapolis, Minn.

•

The appointment of *Emre Bleier* as a sales representative for the Industrial Division of Nopco Chemical Company has been announced. Mr Bleier replaces *William J Gavin,* who has been made a regional sales manager. He will cover Mr Gavin's former territory, which includes metropolitan New York; New Jersey; Philadelphia; Wilmington, Delaware; and parts of Pennsylvania.

Prior to joining Nopco last year as a group leader in the Surfactant Laboratory, Mr Bleier was with Wonder Wash Corp, engaged in technical sales.

•

Appointment of *Herbert Fox* as New York public relations manager of the National Cotton Council became effective November 1.

Mr Fox has been a member of the Council's sales promotion staff in Memphis and New York since 1957.

Mr Fox succeeds *William Baldwin Jr,* who resigned to join the National Foreign Trade Council as public relations director.

•

Bernard W Rottschaefer has been appointed special projects coordinator of the Dyestuff & Chemical Division of General Aniline & Film Corp.

In his new position, Dr Rottschaefer replaces *John C Lawler,* who was recently promoted to plant manager of the division's manufacturing operations at Rensselaer, NY. Dr Rottschaefer was production manager of the Rensselaer plant.

He will make his headquarters at the division's main office at 435 Hudson St, New York, NY.

•

Fabric Research Laboratories, Inc, Dedham, Mass, has announced four additions to the research staff. *Donald H Powers Jr* and *John M Facq* have been appointed to Senior Research Associate positions and *Mrs Chunghi Park* and *Wilma Farrell* have been named research assistants.

For the last four years Dr Powers, an organic chemist, has been a researcher for Owens-Corning Fiberglas Corp, Ashton, RI.

Mr Facq, a research microscopist, for the last eight years has been a research microscopist with The Toni Company, Chicago, Ill.

At FRL, Mr Facq will be involved in applying microscopy techniques to research projects and he will also direct FRL's fiber identification and quantitative analysis service related to determining for clients the precise fiber contents of fur, wool, vegetable, man-made, and specialty fibers in textile fabrics.

•

Russell E Dimery has joined the Gagliardi Research Corp, E Greenwich, RI, as chemist.

Mr Dimery has had experience in all phases of textile plant operations having been associated with Pacific Mills, Glasgo Finishing Co, Sun Chemical Corp, and Arnold, Hoffman & Co, Inc.

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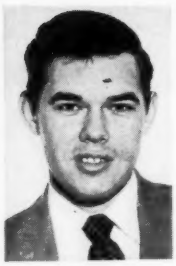

Scott

Grestco Dyes & Chemicals, Co, Inc, Brooklyn, NY, has announced that *Andrew Scott* will be associated with Grestco in the capacity of technical sales representative.

Mr Scott will present Grestco's line of colors and auxiliaries to the printing & dyeing industries as well as provide technical assistance to other Grestco representatives.

Mr Scott for the past eight years has been head colorist with the Stonehenge Processing Co.

•

The following have been named winners of various scholarships offered at the North Carolina State College School of Textiles:

Elbert S Mullis, a senior in textile chemistry, and president of the North Carolina State College Student Chapter, AATCC, $500 Ciba Co scholarship;

Ted H Hager, a junior, also a member of the NCSC Student Chapter, $500 Ciba Co scholarship;

John L Nash and *Galen E Chambers,* seniors, $300 U S Rubber Co scholarships;

John R Newell Jr, senior in textile chemistry, member of NCSC Student Chapter, $500 Blackman-Uhler Co scholarship;

James F Nixon, a junior, $500 Burlington Industries Foundation scholarship;

James N Moser, a senior, $625 Owens-Corning Fiberglas Corp scholarship.

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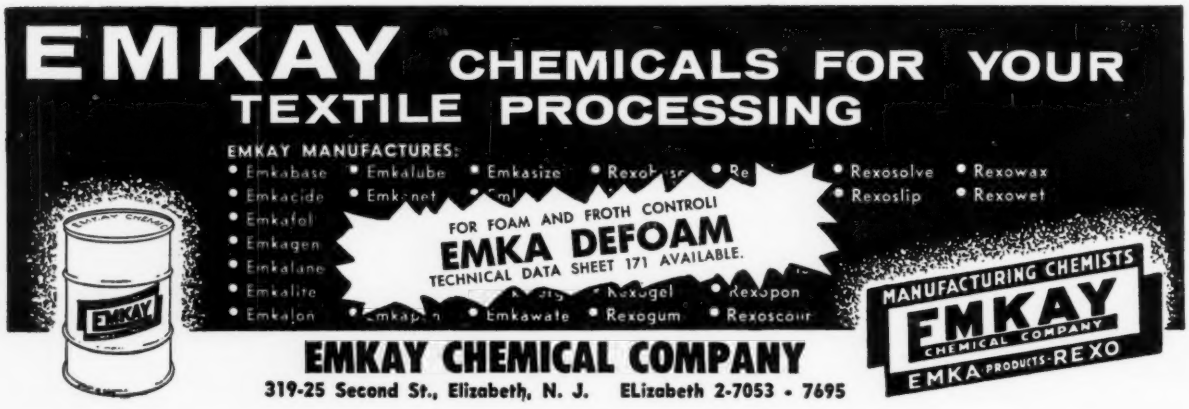
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